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SHIVWITS

Proposed Grazing Management

Draft ENVIRONMENTAL IMPACT STATEMENT

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BUREAU OF LAND MANAGEMENT
ARIZONA STATE OFFICE
2400 VALLEY BANK CENTER
PHOENIX, ARIZONA 85073

Enclosed for your review and comment is the Draft Environmental Impact Statement for the Proposed Livestock Grazing Management Program, Shivwits Resource Area, Mohave County, Arizona.

The environmental impact statement is based on information from the Bureau of Land Management and other sources, including information supplied by and in consultation with Federal, State, and local agencies, and interested private organizations and individuals. The purpose of the statement is to disclose in advance the probable environmental impacts of the proposed action and its alternatives, and to assure that these factors are considered, along with economic, technical, and other considerations, in the decisionmaking process.

We would appreciate receiving your comments on the environmental impacts of the proposed action. The comment period will run for 45 days after the draft is filed with the Environmental Protection Agency and the notice of receipt is published in the Federal Register. The notice is anticipated in December 1979. A public hearing will be held in St. George, Utah, and details of this hearing will be advertised. Comments received after the 45-day review period will be considered in the subsequent decision process even though they may be too late for inclusion in the final environmental impact statement.

Your comments should be sent to:

Arizona State Director
Bureau of Land Management
2400 Valley Bank Center
Phoenix, Arizona 85073

Sincerely,

State Director

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ENVIRONMENTAL IMPACT STATEMENT
SHIVWITS GRAZING MANAGEMENT

Prepared By

BUREAU OF LAND MANAGEMENT
DEPARTMENT OF THE INTERIOR

STATE DIRECTOR, ARIZONA STATE OFFICE

SHIVWITS PROPOSED GRAZING MANAGEMENT

Draft (X)   Final ( )   Environmental Impact Statement

Department of the Interior, Bureau of Land Management

1. Type of Action: Administrative (X)   Legislative ( )

2. Abstract: The Bureau of Land Management proposes to implement livestock grazing management on approximately 1,717,000 acres of public land in northwestern Arizona. Intensive grazing management is proposed for 40 allotments and less intensive management on 10 allotments. The impact statement analyzes the environmental, social, and economic impacts of the management changes and the building of associated range improvements. The production of desirable vegetation and the total vegetation ground cover would increase. Overall watershed conditions would improve. Wildlife habitat would improve, and the numbers of big-game and nongame animals would increase. Surface water quality would improve, and sediment yield would decrease. Overall range-related income would increase in the long term. Proposed range improvements would degrade the area's scenery. Range improvements, cattle trampling, and erosion would slightly disturb archaeological and historical remains. These disturbances would be permanent and irretrievable. Range-related income, ranch values, and assessed valuation could decrease on some grazing operations.

3. Alternatives analyzed:

a. Full stocking with management
b. Stocking level by condition class
c. No vegetative manipulation
d. No action
e. Elimination of grazing on public land

4. Comments have been requested from the following:

See chapter 5.

5. For further information contact:

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Bureau of Land Management
Arizona Strip District Office
196 E. Tabernacle
St. George, Utah 84770
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6. Date draft statement made available to EPA and the public:

December 1979

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SUMMARY

SUMMARY

PROPOSED ACTION AND ALTERNATIVES

The Bureau of Land Management proposes to institute a grazing management program in the Shivwits Resource Area of the Arizona Strip District in Mohave County, Arizona — an area encompassing 1,848,894 acres, 1,717,341 acres of which are Federal land. The grazing program and livestock forage allocation have been derived from objectives and recommendations in the Grand Wash Management Framework Plan. Under this program, livestock grazing would be adjusted to the capability of the range to produce forage on a sustained-yield basis, and utilization of key species would average 50 percent over an extended period of time. Sixty-two existing allotments would be combined into 50 allotments. Forty allotments would be managed intensively under rest-rotation and deferred rotation systems, requiring the preparation of 24 allotment management plans (AMPs) in addition to the 16 AMPs that have already been implemented. Ten additional allotments would be less intensively managed: BLM would regulate only livestock numbers, class of animal, and grazing season. In addition, during years of high precipitation and high vegetation production, BLM may issue supplemental licenses for livestock to graze ephemeral forage.

To implement the proposed grazing systems, BLM proposes the following range improvements (approximate): 86 water developments, 137 miles of fence, 32.5 miles of two-track road, and 128,510 acres of land treatment.

The goal of the proposed action is to attain specific management objectives within 15 years after implementation. The stages of implementation are as follows:

1. Adjust to initial stocking rates.
2. Begin studies and evaluations.
3. Develop waters.
4. Construct fences.
5. Implement grazing systems.
6. Treat land.
7. Upon completion of construction, initiate maintenance schedule for range improvements.

BLM has also proposed the following five alternatives to the proposed action.

1. *Full stocking with Management* would allow stocking at the estimated livestock carrying capacity of each allotment but otherwise would provide the same management as the proposed action.

2. *Stocking Level by Condition Class* would set the stocking level in relation to the average condition and apparent trend of the allotments, allowing ranges in poor or fair condition to recover faster than they would under the proposed action.

3. *No Vegetation Manipulation* would implement all provisions of the proposed action except land treatment, developing the proposed AMPs without the increase in forage expected to result from such treatment.

4. *No Action* proposes no change in grazing from the present. Stocking rates would be limited to recognized active privileges, and the 16 AMPs already implemented would continue in effect.

5. *Elimination of Grazing* would end livestock grazing on Federal lands in the EIS area, requiring range use supervision and the construction of approximately 423 miles of fence to separate Federal from State and private lands.

ENVIRONMENTAL CONSEQUENCES

VEGETATION

The proposed action and alternatives 2, 3, and 5 would improve most vegetation subtypes by one condition class. Alternative 1 (full stocking) would improve condition class only on deferred rotation allotments and on land treatments but would allow little change on other areas. Alternative 4 (no action) would allow little change from current composition, condition, and production, except the normal variability caused by weather.

The proposed action would increase key species composition from 14 to 17 percent and increase average annual production from 55 to 68 air dry pounds per acre. Alternative 2 (stocking by condition class) would improve vegetation the most, increasing key species composition from 14 to 18 percent and average annual production from 55 to 68 air dry pounds per acre. Alternative 3 (no vegetation manipulation) would increase key species composition from 14 to 17 percent and average annual production from 55 to 61 air dry pounds per acre. Finally, alternative 5 would increase key species composition from 14 to 16 percent. Fifteen years after implementation, however, vegetation stagnation from the accumulation of old growth would reduce average annual forage production from 55 to 53 air dry pounds per acre.

Range improvement construction would permanently disturb 121 to 2,345 acres of vegetation, mainly from new waters, which would allow livestock to more heavily graze previously ungrazed or lightly grazed areas.

SOIL

The proposed action and alternatives 1, 2, 3, and 5 would generally benefit soils. The reduction of livestock AUMs by an average of 28 percent under the proposed action and alternative 3; 9 percent under alternative 1; 64 percent under alternative 2; and 100 percent under alternative 5 would increase ground cover (litter and vegetation), reduce soil movement, and reduce raindrop impact. These actions would decrease compaction, increasing infiltration rates and water retention. Soil movement and erosion are expected to decline.

Alternative 4, on the other hand, would generally decrease ground cover and increase soil movement and erosion. Compaction would increase, reducing infiltration and water retention.

WATER RESOURCES

The increase in ground cover expected under the proposed action and alternatives 1, 2, 3, and 5 would increase infiltration, decrease runoff, reduce sediment yield, and improve water quality. Alternative 4, however, would increase runoff and sediment yield and worsen water quality.

ANIMALS

The proposed action would improve overall wildlife habitat and populations. Increases in the species composition of browse, grasses, and forbs should decrease livestock-wildlife competition for food and cover. Excessive utilization under alternative 1 would adversely affect 71 percent of the EIS area, increasing competition among wildlife and between livestock and wildlife on rest-rotation allotments. Alternative 2 would decrease livestock grazing pressure by 64 percent (as compared to 25 percent under the proposed action), and the 5-year grazing deferment on some allotments would improve wildlife food and cover. Grazing systems under the no vegetation manipulation alternative (alternative 3) would have the same impacts on animals as the proposed action. The no-action alternative (alternative 4) would reinforce the deterioration of biotic communities, not significantly changing the present impact of grazing systems on wildlife on non-AMP allotments.

The elimination of grazing on Federal lands would benefit wildlife habitat the most of all alternatives. Livestock-wildlife competition would end, and plant succession would proceed to a more natural state, reducing densities of subclimax species but increasing the overall diversity of wildlife.

Range improvements would have varied impacts on wildlife. New water developments would benefit water-dependent species, allowing them to expand into habitats previously lacking water. Increased food and cover around fenced reservoirs would also enhance habitats. Intensive livestock use around each new water, however, would disturb approximately 125 acres, reducing protective cover and forage and increasing the vulnerability of prey species to predators. Fence construction would interfere with mule deer, pronghorn, and bighorn sheep movement, resulting in some death by entanglement and possible changes in movement patterns. Land treatment would generally benefit wildlife habitat, although the diversity of nongame wildlife is expected to decrease in treated areas.

CULTURAL RESOURCES

The inventory and assessment of cultural resources required by the proposed action and all alternatives would increase scientific knowledge of the area and provide a data base of long-term gains. If an inventory, however, fails to discover a site that is later destroyed by range development construction, scientific data would be permanently lost.

The only significantly adverse impacts on cultural resources would result from land treatment. Chaining and plowing could highly affect surface and subsurface sites, disturbing the surface, mixing soil, and breaking artifacts. Burning would have the highest adverse impacts, fracturing lithics, discoloring and distorting ceramics, burning flammable artifacts, contaminating a site for carbon 14 dating and pollen analysis, and exposing a site or artifacts through loss of vegetation.

VISUAL RESOURCES

Of the provisions of the proposed action and alternatives, range improvement construction would have the greatest impact on visual resources. Many of the impacts, however, would be short-term and could be naturally mitigated through revegetation. Catchment and reservoir construction would highly disturb the form, color, and texture of the landscape, and vegetation disturbance caused by cattle grazing and trampling would have a moderately adverse long-term visual impact on 35 acres around each water.

Eliminating grazing on Federal lands would generally benefit visual resources by improving vegetation cover. The 423 miles of new fence, however, would intrude on the natural landscape, creating a vegetation contrast that would be apparent where private and State land adjoin nongrazed Federal lands.

LIVESTOCK GRAZING

The proposed action and alternatives 1, 2, and 3 would all improve livestock performance, causing a 5-15 percent increase in percent calf crops, a 5-10 percent increase in weaned calf weights, a 20-25 percent decrease in animal death rates, and a 3-10 percent increase in cull cow weights. The least improvement of these alternatives would occur under the full-stocking alternative, and the most improvement would occur under the stocking by condition class alternative. With the exception of an increase in weaned calf weights, the no-action alternative would result in decreases in livestock performance.

RECREATION

The proposed action and alternatives would both benefit and interfere with outdoor recreation in the EIS area. All alternatives except full stocking and no action in the long term would benefit hunting. Improved forage and new water sources would aid mule deer and antelope populations. Land treatment on pinyon-juniper would benefit small game, but treatment on sagebrush and blackbrush would destroy small-game cover.

Eliminating grazing would improve vegetation species, composition, and diversity, benefiting big and small game and moderately improving hunting quality, opportunity, and visitor use. Installing 423 miles of new fence would restrict vehicular access for hunters, but new obstructions would be offset by the removal of 931 miles of existing fence.

Permitting higher forage utilization, the full stocking alternative would increase livestock conflicts with big and small game, adversely affecting the quality and opportunity for hunting. The no-action alternative would perpetuate the population decline of both big and small game.

Under all alternatives, visitor use for sightseeing, primitive experiences, and off-road vehicles (ORVs) would remain low. Under the proposed action and alternatives 1, 2, and 3 range improvement intrusions would lower scenic values, just as their removal under the elimination of grazing would improve scenic values, decrease access and vandalism, and decrease ORV opportunity and use and the quality of the ORV experience. ORV use would slightly increase under all alternatives except elimination of grazing.

ECONOMIC AND SOCIAL CONDITIONS

The greatest impact on employment and income would result from the elimination of grazing on Federal lands. An estimated 355 people in the North Rim Social-Economic Profile Area (SEPA) depend directly or indirectly on EIS-area livestock grazing for employment and income. Since many ranch operators have other sources of income, the extent of dependency is not known. Eliminating grazing, however, would eliminate an estimated $717,000 of direct and indirect income for the SEPA or 1 percent of the SEPA's total income.

Under the proposed action and all alternatives, ranch income for all sizes would decline in the short term. After implementation, however, annual income under the proposed action and alternatives 1 and 2 would increase with increases in AUMs of forage and improvements in livestock performance. Alternative 2 would produce the largest average annual long-term increase — $457,000 — although initial AUM adjustments under alternative 2 might force operators out of business. The increase under alternative 1, requiring less initial adjustments in AUMs, would not be nearly as great as under the proposed action and alternative 2. Income under alternative 3 would not increase, since AUMs would not increase and improved livestock performance would not be great enough to offset the initial reductions in AUMs.

Alternative 5, the elimination of grazing, might force as many as 40 of the 60 operators out of business and would economically hurt all operators.

MITIGATION

Since the proposed action and alternatives require extensive mitigation through design restrictions and clearance processes, BLM proposes few other mitigative measures. To mitigate adverse impacts on wildlife, BLM will conduct a series of studies to obtain data, upon which further mitigation will be based. To mitigate some adverse economic impacts, BLM will pay for increased percentages of total costs for construction projects and will be responsible for partial maintenance of some projects. Finally, to mitigate adverse impacts of water developments in Littlefield Community allotment on recreation and primitive values, BLM will locate these developments outside Paiute Primitive Area. The remaining adverse impact will not be mitigated.

CHAPTER 1

PROPOSED ACTION AND ALTERNATIVES

CHAPTER 1

PROPOSED ACTION AND ALTERNATIVES

INTRODUCTION

LOCATION

The Shivwits Environmental Impact Statement (EIS) area (map 1-1) consists of the portion of the Bureau of Land Management's (BLM) Arizona Strip District lying west of the Hurricane Cliffs and includes the District's Shivwits Resource Area. In addition, the EIS area includes a partial allotment in the Vermillion Resource Area (5,297 acres), a portion of the Lake Mead National Recreation Area (202,300 acres), a portion of Grand Canyon National Park (128,334 acres), and lands in Utah (16,180 acres) and Nevada (21,464 acres), where allotments cross State lines. BLM administers public lands within the EIS area from a district office in St. George, Utah and a State Office in Phoenix, Arizona. This EIS uses the term "Federal lands" to refer to public lands administered entirely by BLM and to lands administered by the National Park Service but on which grazing is administered by BLM.

PURPOSE AND NEED

This EIS focuses primarily on proposed and alternative grazing management in that portion of Mohave County, Arizona, north of the Colorado River. Grazing is only one of several multiple-use activities occurring on the area's public lands. This EIS identifies and discusses the proposed action and the alternatives' impacts on the natural and human environment. The purpose of this action is to maintain or improve public land resources (rangeland ecosystems), which include soil, water, vegetation, wildlife habitat, and wildlife.

To comply with law (Taylor Grazing Act, 1934, Classification and Multiple Use Act, Public Law 88-6071, 1964, and the Federal Land Policy and Management Act of 1976) and meet the needs of all resources requires planning and implementation of sound grazing management. Livestock use must be reduced to a level that the range ecosystem can reliably support, grazing use must be better distributed, and conflicts with other resources must be eliminated.

This EIS analyzes the proposed action and alternatives to it, identifies impacts on the environment, and addresses mitigating measures to reduce adverse impacts.

PROPOSED ACTION

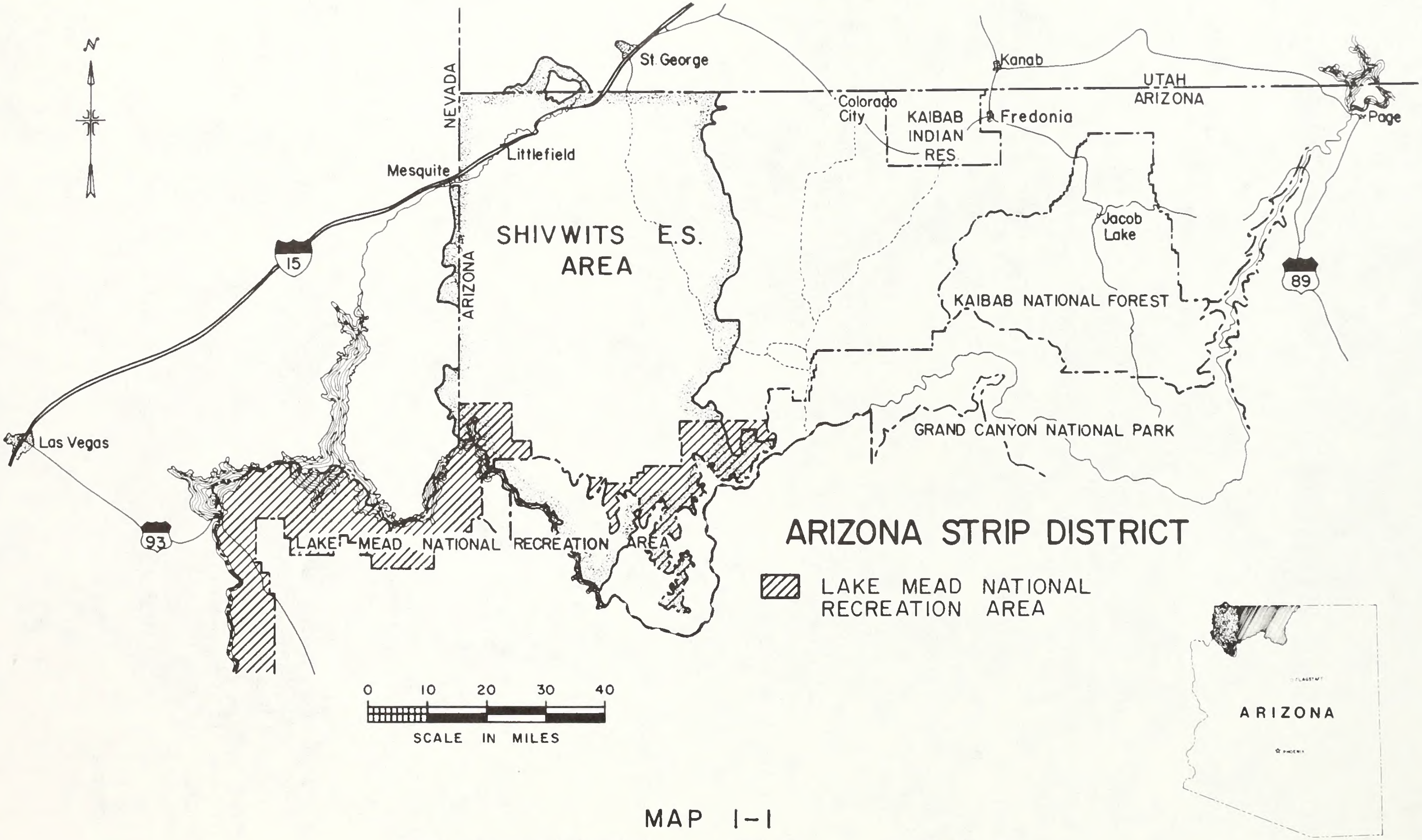
The proposed grazing management program and livestock forage allocations have been derived from objectives and recommendations in the Grand Wash Management Framework Plan (MFP) covering the EIS area.

The grazing management program includes intensive and less intensive grazing management. (See table 1-1.) Inherent in both components is the adjustment of livestock grazing to the capability of the range to produce forage on a sustained yield basis. This adjustment involves holding utilization of key forage plant species to moderate levels — 40 to 60 percent — of the current year's growth. (See appendix 1-1.) Utilization of key species would average 50 percent over an extended time (considering all grazed pastures). The remainder of the vegetation would serve for nongame wildlife food and cover, soil and watershed protection, and vegetation resource maintenance.

The average annual licensed livestock use on Federal lands in the EIS area during the past 5 years has been 83,940 animal unit months (AUMs). The proposal would allow 64,305 AUMs for livestock, a reduction of 19,635 AUMs or 24 percent from the 5-year average. Wildlife would be allocated 15,590 AUMs (in cooperation with Arizona Game and Fish Department, February 11, 1975).

Table 1-1 shows the acreage and the percentage of the EIS area proposed for intensive and less intensive grazing systems, acres unalloted for grazing, and total acres within the EIS boundary. The present, proposed, and potential stocking rates by proposed allotments (see plate 1 for allotment boundaries) appear in tables 1-2 and 1-3. Range specialists determined stocking rates using carrying capacity data gathered (and portions rechecked) between 1974 and 1978. (See appendix 1-1 for methodology.) Wild burros would be allocated 500 AUMs.

Range improvements, such as fences and water sources, would be required to implement



MAP I-1
SHIVWITS ES AREA

TABLE 1-1
ACRES PROPOSED FOR INTENSIVE AND LESS INTENSIVE MANAGEMENT

Proposed Action (Components)	Federal Land Acres	Other Acres	Total Acres	Percent of ES Area
Intensive livestock management (39 allotments)	1,623,334	120,222	1,743,556	94
Less intensive management (11 allotments)	77,696	11,331	89,027	5
Land under AMPs	1,701,030	131,553	1,832,583	99
Unalloted land	16,311	--	16,311	1
Total land within ES area	1,717,341	131,553	1,848,894	100

*The proposed action would not affect acres unallotted for grazing.

TABLE 1-2
LIVESTOCK GRAZING SUMMARY

LEGEND

1/ Unfenced private or State land within an allotment but not owned or leased by the livestock operator. BLM does not license additional carrying capacity for grazing on these lands.

2/ Represents an average of available actual use data for allotments with implemented AMPs and the 5-year licensed use on all remaining allotments. All use is by cattle.

3/ Represents maximum allowable use at present and reflects any previous reduction in grazing preference.

4/ Includes wildlife AUMs. See appendix 1-1 for methodology to determine carrying capacity.

5/ Estimated livestock carrying capacity of State lands.

6/ YL = Yearlong

7/ Ephemeral use would be allowed on these allotments in favorable years.

8/ Some AMPs could incorporate two or more grazing systems, such as a spring-summer system and a fall-winter system, each system using its own separate pastures.

TABLE 1-2
LIVESTOCK GRAZING SUMMARY

Grazing System and Allotment	I.D. No.	Total Acres	Federal Acres	State Acres	Private Acres	Uncontrolled Acres 1/	Average 5-year License 2/	Active Privileges AUMs 3/	Season of Use	Estimated Carrying Capacity	
										Federal AUMs 4/	State AUMs 5/
INTENSIVE MANAGEMENT											
Four Pasture Rest-Rotation System											
Little Tank (Implemented 1972)	4853	5,965	4,356	1,609	-	-	662	623	YL 6/	788	159
Lower Hurricane 7/ (Implemented 1972)	4837	50,810	49,415	1,235	160	-	4,815	5,193	YL	6,571	123
Mud and Cane 8/	4858	83,830	81,259	2,571	-	-	4,883	5,130	YL	4,639	129
Total		140,605	135,030	5,415	160	0	10,360	10,946		11,998	411
Three Pasture Rest-Rotation System											
Black Rock 7/ (Implemented 1969)	4841	36,315	32,295	3,454	566	-	1,192	2,866	YL	2,150	204
Cottonwood	4809	33,155	32,605	550	-	-	1,791	2,303	YL	1,909	23
Diamond Butte	4833	5,455	3,534	320	1,601	-	346	408	YL	370	34
Duncan Tank (Implemented 1972)	4829	10,351	6,739	1,260	2,352	192	442	583	YL	677	104
Grassie Mountain 8/	4825	113,262	108,029	5,153	80	55	5,704	10,174	YL	6,356	244
Hidden and Sullivan	4817	35,062	34,177	885	-	320	1,782	3,270	YL	2,409	39
Ivanpah (Implemented 1972)	4858	14,955	12,996	1,279	680	-	827	1,089	YL	937	118
Last Chance and Link	4815	37,721	36,341	1,380	-	-	2,170	2,734	YL	1,715	47
Little Wolf (Implemented 1968)	4814	7,272	7,272	-	-	-	305	640	6/1-10/31	599	0
Mt. Trumbull 7/ (Implemented 1970)	4826	32,899	29,843	2,104	952	103	1,114	1,894	YL	1,741	204
Parashaunt 8/ (Implemented 1974)	4829	202,698	190,456	800	11,442	800	3,292	3,708	11/1-10/30	6,360	0
Pa's Pocket	4848	18,223	15,176	1,497	1,550	-	1,034	1,361	YL	914	80
Sullivan Canyon 7/ (Implemented 1973)	4810	24,983	24849	100	34	-	1,232	2,203	YL	1,504	4
Sunshine	4863	17,523	17,523	-	-	-	996	1,218	YL	1,389	0
Wildcat 8/	4854	153,507	145,125	3,041	5,341	40	8,052	9,653	YL	7,970	236
Wolfhole Lake	4823	13,021	12,341	-	680	-	723	798	YL	1,351	0
Total		756,402	709,301	21,823	25,278	1,510	31,002	44,902		38,351	1,337
Deferred Rotation Grazing System											
Blake Pond 7/	4813	20,723	19,388	1,255	80	-	1,488	1,700	YL	1,306	75
Beaver Dam Slope 7/ (Implemented 1968)	4828	36,088	33,798	1,414	876	1,116	802	903	12/1-5/31	802	54
Clay Spring (Implemented 1971)	4845	12,003	12,003	-	-	-	1,142	960	12/1-11/30	1,177	0
Jackson Tank (Implemented 1967)	4830	7,817	7,817	-	-	-	737	981	9/16-6/15	708	0
Jump Canyon	4801	27,369	25,466	1,903	-	-	2,177	2,286	10/20-6/15	1,584	133
Littlefield Community 7/, 8/	4827	76,611	70,296	2,228	4,087	2,167	3,501	4,311	YL	2,986	86
Lizard 7/	4857	13,186	4,197	8,989	-	1,487	168	178	10/16-6/15	210	413
Mainstreet 8/ (Partially implemented 1974)	4805	107,765	100,027	7,193	545	583	8,333	11,744	12/1-11/20	7,214	567
Mesquite Community 7/, 8/	4832	55,324	52,519	550	2,255	2,335	2,568	2,809	YL	2,562	18
Mormon Well 7/	4844	15,389	13,099	2,130	160	-	326	434	11/16-5/31	554	49
Mule Canyon 7/	4821	25,853	25,465	240	148	19	1,023	1,811	YL	710	3
Mosby-Nay 7/	4836	24,608	22,688	1,920	-	640	1,155	1,202	YL	657	36

TABLE 1-2 (continued)

Grazing System and Allotment	I.D. No.	Total Acres	Federal Acres	State Acres	Private Acres	Uncon-trolled Acres 1/	Average 5-year License 2/	Active Privi-leges AUMs 3/	Season of Use	Estimated Carrying Capacity Federal AUMs 4/	Estimated Carrying Capacity State AUMs 5/
Deferred Rotation Grazing System (cont.)											
Pakoon Spring 7/	4800	34,722	33,967	655	100	15	1,126	1,261	YL	1,102	20
Penns Well 8/	4852	23,187	21,908	660	619	20	719	1,110	YL	816	58
Poverty 8/ (Implemented 1974)	4804	74,601	55,172	14,933	4,496	195	5,337	5,851	12/1-11/30	5,365	1,591
Sullivan Tank	4816	13,550	13,390	160	-	160	452	974	YL	497	0
Tassi 7/	4851	123,397	122,637	600	160	9,690	1,087	1,188	YL	2,937	14
Toquer Tank (Implemented 1972)	4861	12,492	11,852	640	-	-	1,073	1,576	11/1-5/31	1,127	102
Whiterock-Soapstone (Implemented 1968)	4805	18,614	18,572	-	42	-	1,259	1,120	10/15-6/30	1,400	0
Wolfhole Canyon 7/, 8/	4811	74,100	68,841	4,899	360	-	2,980	4,479	YL	3,171	124
Wolfhole Mountain 8/	4839	49,150	45,901	3,049	200	635	2,279	2,500	YL	2,230	70
Total		846,549	779,003	53,418	14,128	19,062	39,732	49,378		39,115	3,413
INTENSIVE MANAGEMENT TOTALS		1,743,556	1,623,334	80,656	39,566	20,572	81,094	105,226		89,464	5,161
LESS INTENSIVE MANAGEMENT (Reduced to 45 percent utilization)											
Littlefield Free Use 7/	4843	2,823	2,669	-	154	355	129	160	12/15-2/28	122	0
Iverson	4834	2,403	320	-	2,083	-	36	36	YL	48	0
Mustang Spring	4859	9,948	9,308	640	-	-	553	566	YL	638	8
Pakoon 7/	4822	47,300	47,038	262	-	262	987	1,536	2/1-6/28	1,152	8
Pat's Pond	4862	1,285	643	-	642	-	61	69	6/1-11/1	71	0
Purgatory 7/	481	6,862	6,396	465	-	-	435	466	3/1-5/25	280	11
Quail Canyon	4856	8,733	8,573	160	-	-	307	311	YL	494	8
Rosenberry	4846	3,975	1,415	-	2,560	-	172	172	YL	190	0
Shelly	4807	2,190	694	640	856	-	86	106	6/1-6/30, 11/1-11/30	70	63
Snyder	4806	3,508	640	640	2,228	-	80	91	10/20-12/1, 6/15-10/15	73	71
Unallotted	-	16,311	16,311	-	-	-	-	-	-	-	-
Total		105,338	94,007	2,808	8,523	617	2,846	3,513		3,138	169
GRAND TOTALS		1,848,894	1,717,341	83,464	48,089	21,189	83,940	108,739		92,602	5,330

TABLE 1-3
LIVESTOCK GRAZING SUMMARY PROPOSED ACTION AND ALTERNATIVES

LEGEND

1/ Initial stocking rate includes normal operation and normal flexibility. All use is by cattle.

2/ All wildlife AUM allocations come from Federal lands and represent competitive as well as noncompetitive use. Wildlife allocations are based on reasonable big-game numbers, and available wildlife AUMs exceed the identified need.

3/ AUMs allocated for vegetation maintenance and watershed protection, resulting from rest pastures and moderate utilization.

4/ Adjusted AUMs represent the difference between average 5-year license (table 1-2) and initial livestock stocking rate.

5/ Total estimated increase in AUMs, 15 years after implementation of AMPs. This estimate also includes increases expected from land treatments. See appendix 1-1 for the methodology used to determine carrying capacity and increased forage.

6/ Season of use would not change from the present, with the exception of Quail Canyon which will change from yearlong to seasonal (10/1 to 3/31).

7/ 4RR = four pasture rest-rotation, 3RR = three pasture rest-rotation, DR = Deferred rotation, SL = Season long, CU = Continuous use, and LIM = Less Intensive Management.

TABLE 1-3

LIVESTOCK GRAZING SUMMARY: PROPOSED ACTION AND ALTERNATIVLS

			INITIAL LIVESTOCK STOCKING RATE AUMs 1/				WILDLIFE AUMs 2/		RESOURCE CONSERVATION AUMs 3/					MANAGEMENT			ADJUSTED AUMs 4/					TOTAL ESTIMATED INCREASED A			
ng System and ment	I.D. No.	Estimated Livestock Carrying Capacity	Proposed Action and Alternative 3	Alternative 1 Full Stocking	Alternative 2 Stocking by Condition	Alternative 4 No Action	Proposed Action and Alternatives 1-2-3-5	Alternative 4 No Action	Proposed Action and Alternative 3	Alternative 1 Full Stocking	Alternative 2 Stocking by Condition	Alternative 4 No Action	Alternative 5 Elimination	Season Of Use 6/	Present Management 7/	Proposed Management 7/	Proposed Action And Alternative 3	Alternative 1 Full Stocking	Alternative 2 Stocking By Condition	Alternative 4 No Action	Alternative 5 Elimination	Proposed Action	Alternative 1 Full Stocking	Alternative 2 Stocking By Condition	Alternative 3 No Vegetation Ma-nipulation
sive Management																									
Pasture Rest-Rotation System																									
e Tank	4853	772	575	772	575	623	16	0	197	0	197	0	772	YL	4RR	4RR	- 87	+ 110.	- 87	- 39	- 662	96	0	223	96
Hurricane	4837	6,420	4,815	6,420	4,815	5,193	151	0	1,605	0	1,605	0	6,420	YL	4RR	4RR	0	+1,605	0	+ 378	-4,815	526	0	1,415	526
nd Cane	4858	3,779	2,834	3,779	Defer	5,130	860	0	945	0	3,779	0	3,779	YL	CU	4RR	-2,049	-1,104	-4,883	+ 247	-4,883	2,384	594	2,393	1,240
AL		10,971	8,224	10,971	5,390	10,946	1,027		2,747		5,581		10,971				-2,136	+ 611	-4,970	+ 586	-10,360	3,006	594	4,031	1,862
Pasture Rest-Rotation System																									
Rock	4841	1,489	993	1,489	588	2,866	661	0	496	0	901	0	1,489	YL	3RR	3RR	- 199	+ 297	- 604	+1,674	-1,192	750	710	857	40
nwood	4809	1,831	1,221	1,831	Defer	2,303	78	0	610	0	1,831	0	1,831	YL	CU	3RR	- 570	+ 40	-1,791	+ 512	-1,791	810	202	816	608
nd Butte	4833	349	233	349	233	408	21	0	116	0	116	0	349	YL	DR	3RR	- 113	+ 3	- 113	+ 62	- 346	87	0	198	87
n Tank	4829	630	418	630	418	583	47	0	212	0	212	0	630	YL	3RR	3RR	- 24	+ 188	- 24	+ 141	- 442	104	0	239	104
le Mountain	4825	4,593	3,063	4,593	2,755	10,174	1,763	0	1,530	0	1,838	0	4,593	YL	CU	3RR	-2,641	-1,111	-2,949	+4,470	-5,704	5,474	4,973	5,763	501
n and Sullivan	4817	1,910	1,274	1,910	Defer	3,270	499	0	636	0	1,910	0	1,910	YL	CU	3RR	- 508	+ 128	-1,782	+1,488	-1,782	0	0	0	0
nh	4858	806	523	806	313	1,089	131	0	283	0	493	0	806	YL	CU	3RR	- 304	- 21	- 514	+ 262	- 827	187	0	325	187
Chance and	4815	1,235	824	1,235	Defer	2,734	480	0	411	0	1,235	0	1,235	YL	CU	3RR	-1,346	- 935	-2,170	+ 564	-2,170	0	0	320	0
e Wolf	4814	427	282	427	Defer	640	172	0	145	0	427	0	427	6/1-10/31	SL	3RR	- 23	+ 122	- 305	+ 335	- 305	0	0	0	0
rumbull	4826	1,687	1,114	1,687	668	1,894	54	0	573	0	1,019	0	1,687	2/1-11/30	SL	3RR	0	+ 573	- 446	+ 780	-1,114	0	0	0	0
aunt	4829	4,988	3,292	4,988	1,975	3,708	1,372	0	1,696	0	3,013	0	4,988	YL	CU	3RR	0	+1,696	-1,317	+ 416	-3,292	1,157	1,100	1,765	57
ocket	4848	760	507	760	507	1,361	154	0	253	0	253	0	760	12/1-5/31	SL	3RR	- 527	- 274	- 527	+ 327	-1,034	367	255	543	112
an Canyon	4810	1,046	938	1,046	Defer	2,203	458	0	108	0	1,046	0	1,046	YL	CU	3RR	- 294	- 186	-1,232	+ 971	-1,232	598	420	598	178
ne	4863	1,360	907	1,360	816	1,218	29	0	453	0	544	0	1,360	YL	CU	3RR	- 89	+ 364	- 180	+ 222	- 996	580	0	592	580
t	4854	5,055	3,371	5,055	Defer	9,653	2,915	0	1,684	0	5,055	0	5,055	YL	CU	3RR	-4,681	-2,997	-8,052	+1,601	-8,052	1,854	1,769	1,929	85
le Lake	4823	1,131	754	1,131	754	798	220	0	377	0	377	0	1,131	YL	CU	3RR	+ 31	+ 408	+ 31	+ 75	- 723	946	716	1,195	230
L		29,297	19,714	29,297	9,027	44,902	9,054		9,583		20,270		29,297				-11,288	-1,705	-21,975	+13,900	-31,002	13,177	10,145	15,140	2,769
ed Rotation Systems																									
Dam Slope	4828	772	772	772	Defer	903	30	0	0	0	772	0	772	12/1-5/31	SL	DR	- 30	- 30	- 802	+ 101	- 802	0	0	0	0
Pond	4813	1,264	1,264	1,264	758	1,700	42	0	0	0	505	0	1,264	YL	CU	DR	- 224	- 224	- 730	+ 212	-1,488	778	778	843	227
pring	4845	1,106	1,106	1,106	664	960	71	0	0	0	442	0	1,106	YL	SL	DR	- 36	- 36	- 478	- 182	-1,142	123	123	256	123
n Tank	4830	673	673	673	673	981	35	0	0	0	0	0	673	9/16-6/15	SL	DR	- 64	- 64	- 64	+ 244	- 737	303	303	696	303

TABLE 1-3 (continued)

			INITIAL LIVESTOCK STOCKING RATE AUMs 1/				WILDLIFE AUMs 2/		RESOURCE CONSERVATION AUMs 3/					MANAGEMENT			ADJUSTED AUMs 4/					TOTAL ESTIMATED INCREASED AUMs 5/					
Grazing System and Allotment	I.D. No.	Estimated Livestock Carrying Capacity	Proposed Action and Alternative 3	Alternative 1 Full Stocking	Alternative 2 Stocking by Condition	Alternative 4 No Action	Proposed Action and Alternatives 1-2-3-5	Alternative 4 No Action	Proposed Action and Alternative 3	Alternative 1 Full Stocking	Alternative 2 Stocking by Condition	Alternative 4 No Action	Alternative 5 Elimination	Season Of Use 6/	Present Management 7/	Proposed Management 7/	Proposed Action And Alternative 3	Alternative 1 Full Stocking	Alternative 2 Stocking By Condition	Alternative 4 No Action	Alternative 5 Elimination	Proposed Action	Alternative 1 Full Stocking	Alternative 2 Stocking By Condition	Alternative 3 No Vegetation Manipulation	Alternative 4 No Action	Alternative 5 Elimination
Deferred Rotation Systems (continued)																											
Lizard	4857	210	210	210	126	178	0	0	0	0	84	0	210	10/16-6/15	SL	DR	+ 42	+ 42	- 42	+ 10	- 168	157	157	261	157	0	0
Mainstreet	4805	6,690	6,690	6,690	4,014	11,744	524	0	0	0	2,676	0	6,690	YL	CU	DR	-1,643	-1,643	-4,319	+3,411	-8,333	2,608	2,608	4,018	1,416	1,416	0
Mesquite Community	4832	2,153	2,153	2,153	Defer	2,809	409	0	0	0	2,153	0	2,153	YL	CU	DR	- 415	- 415	-2,568	+ 241	-2,568	0	0	0	0	0	0
Mormon Well	4844	525	525	525	Defer	434	29	0	0	0	525	0	525	11/16-2/28	SL	DR	+ 199	+ 199	- 326	+ 108	- 326	0	0	0	0	0	0
Mule Canyon	4821	603	603	603	Defer	1,811	107	0	0	0	603	0	603	YL	CU	DR	- 420	- 420	-1,023	+ 788	-1,023	178	178	178	178	0	0
Mosby-Nay	4836	648	648	648	Defer	1,202	9	0	0	0	648	0	648	YL	CU	DR	- 507	- 507	-1,155	+ 47	-1,155	79	79	79	79	0	2
Pakoon Spring	4800	1,078	1,078	1,078	862	1,261	24	0	0	0	216	0	1,078	YL	CU	DR	- 48	- 48	- 264	+ 135	-1,126	184	0	117	184	0	69
Penns Well	4852	589	589	589	Defer	1,110	227	0	0	0	589	0	589	YL	CU	DR	- 130	- 130	- 719	+ 391	- 719	57	57	150	57	0	0
Poverty	480	4,783	4,783	4,783	3,826	5,851	582	0	0	0	957	0	4,783	YL	CU	DR	- 554	- 554	-1,511	+ 514	-5,337	1,916	1,916	3,846	717	717	0
Sullivan Tank	4816	329	329	329	Defer	974	168	0	0	0	329	0	329	YL	CU	DR	- 123	- 123	- 452	+ 522	- 452	0	0	0	0	0	0
Tassi	4851	2,292	2,292	2,292	Defer	1,188	645	0	0	0	2,292	0	2,292	YL	CU	DR	+1,205	+1,205	-1,087	+ 101	-1,087	0	0	0	0	0	0
Toquer Tank	4861	1,073	1,073	1,073	1,073	1,576	54	0	0	0	0	0	1,073	11/1-5/31	SL	DR	0	0	0	+ 503	-1,073	257	257	583	257	257	0
Whiterock-Soapstone	480	1,259	1,259	1,259	755	1,120	141	0	0	0	504	0	1,259	10/15-6/30	SL	DR	0	0	- 504	- 139	-1,259	0	0	0	0	0	0
Wolfhole Canyon	4811	2,851	2,851	2,851	1,710	4,479	320	0	0	0	1,141	0	2,851	YL	CU	DR	- 129	- 129	-1,270	+1,499	-2,980	759	759	984	419	0	240
Wolfhole Mountain	4839	1,869	1,869	1,869	Defer	2,500	361	0	0	0	1,869	0	1,869	YL	CU	DR	- 410	- 410	-2,279	+ 221	-2,279	1,601	1,601	1,553	586	0	196
TOTAL		33,869	33,869	33,869	14,461	49,378	5,246		0		19,409		33,869				-5,863	-5,863	-25,271	+9,646	-39,732	10,681	10,681	15,604	4,741	2,815	507
INTENSIVE MANAGEMENT TOTALS		74,137	61,807	74,137	28,878	105,226	15,327		12,330		45,260		74,137				-19,287	-6,957	-52,216	+24,132	-81,094	26,864	21,001	34,775	9,372	4,003	1,346
Less Intensive Management																											
Littlefield Free Use	4843	120	108	120	Defer	160	2	0	12	0	120	0	120	12/15-2/28	LIM	LIM	- 21	- 9	- 129	+ 31	- 129	22	0	15	22	0	0
Iverson	4834	47	36	47	36	36	1	0	11	0	11	0	47	YL	LIM	LIM	0	+ 11	0	0	- 36	51	0	114	51	0	0
Mustang Spring	4859	511	459	511	275	566	127	0	52	0	236	0	511	YL	LIM	LIM	- 94	- 42	- 278	+ 13	- 553	93	0	102	93	0	4
Pakoon	4822	1,099	989	1,099	593	1,536	53	0	110	0	506	0	1,099	2/1-6/30	LIM	LIM	+ 2	+ 112	- 394	+ 549	- 987	0	0	0	0	0	0
Pat's Pond	4862	71	61	71	61	69	0	0	10	0	10	0	71	6/1-2/28	LIM	LIM	0	+ 10	0	+ 8	- 61	22	0	53	22	0	0
Purgatory	4831	275	247	275	Defer	466	5	0	28	0	275	0	275	11/15-3/15	LIM	LIM	- 188	- 160	- 435	+ 31	- 435	0	0	0	0	0	0
Quail Canyon	4856	431	312	431	232	311	63	0	119	0	198	0	431	10/1-3/31	LIM	LIM	+ 5	+ 124	- 75	+ 4	- 307	109	0	74	109	0	37
Rosenberry	4846	190	172	190	172	172	0	0	18	0	18	0	190	YL	LIM	LIM	0	+ 18	0	0	- 172	87	0	192	87	87	0
Shelley	4807	58	52	58	52	106	12	0	6	0	6	0	58	6/1-6/30 11/1-11/30	LIM	LIM	- 34	- 28	- 34	+ 20	- 86	32	0	74	32	0	0
Snyder	4806	73	62	73	62	91	0	0	11	0	11	0	73	10/20-12/1 6/15-10/15	LIM	LIM	- 18	- 7	- 18	+ 11	- 80	67	0	138	67	0	0
TOTAL		2,875	2,498	2,875	1,483	3,513	263		377		1,391		2,875				- 348	+ 29	-1,363	+ 667	-2,846	483	0	762	483	87	41
GRAND TOTALS		77,012	64,305	77,012	30,361	108,739	15,590		12,707		47,536		78,788				-19,635	-6,928	-53,579	+24,799	-83,940	27,347	21,001	35,537	9,855	4,090	1,387

intensive management, but none would be needed to implement less intensive management.

The proposed action would combine 62 existing allotments and would modify the existing management and level of grazing. Only one of the proposed allotment combinations would combine two permittees now running individual allotments (Link Spring and Last Chance allotments). The remainder would combine allotments owned by the permittee. The proposal would involve the following actions:

- *Combining smaller allotments.* To reach the best possible combination for management, this action considers resource values, physical barriers, potential for improvement, economics, and existing use.

- *Adjusting current levels of grazing.* This action considers amount and quality of vegetation, wildlife competition, resource condition and trend, utilization, range suitability, and period of use.

- *Changing period of use.* This action considers vegetation and wildlife needs, watershed condition, and operator needs.

- *Implementing grazing management systems.* This action considers MFP objectives, such as competition with wildlife, watershed condition, opportunities for improvement, management goals, and construction of range improvements. Specific multiple-use objectives would be outlined in developing allotment management plans (AMPs).

- *Monitoring and evaluation.* Once implemented, the proposed grazing management program would be dynamic and flexible. Stocking levels and use periods could be adjusted in response to fluctuating precipitation and forage conditions. If evaluation and monitoring indicate the need for changes, the proposal would be modified, and a supplementary environmental assessment would be prepared for significant changes.

The proposed action would require increased management and supervision of public lands and increased cooperation between BLM and range users. It would be administered through standard BLM licensing and operating procedures.

After AMPs are prepared and implemented, an estimated 15 years would be required to meet the AMP objectives for long-term sustained productivity of livestock forage and watershed and wildlife improvement. This time span would allow for several repetitions of the grazing cycle (alternate periods of grazing and resting) on all allotments. BLM would not develop specific objectives for allotments proposed for less intensive management but would regularly monitor the allotments for maintenance of good or improvement of fair condition.

INTENSIVE MANAGEMENT OF GRAZING

BLM proposes intensive livestock management for 40 allotments involving 1,623,334 acres of Federal lands and 61,807 AUMs of livestock forage. The Arizona Strip District would prepare AMPs for 24 allotments. The remaining 16 allotments are already managed under implemented AMPs (597,462 Federal acres). AMPs would be prepared during a 3-year period immediately following the filing of the final EIS. The AMPs would be developed in cooperation with the operator and coordinated with affected land owners. Table 1-4 shows the schedule and priorities for AMP preparation.

Preparing AMPs and formulating grazing systems would be guided by the Grand Wash Management Framework Plan (MFP), the land use plan for the Shivwits Resource Area. The MFP identifies grazing management constraints needed to improve or maintain range condition and strongly encourages compliance with the following criteria in preparation of specific grazing management proposals:

- Any given area may not be grazed more than one spring growing period (green-up to seed-ripe) during a 3-year period.

- Any given area may not be grazed more than two summer growing periods (green-up to seed-ripe) during a 3-year period.

- Pasture movement dates will be based on phenological requirements of all key species found on an allotment.

- At least 1 full year's rest for a portion of the allotment will be required during each grazing cycle.

- Grazing will not begin in areas above 6,000 feet before June of each year.

- Grazing will be restricted to the estimated livestock carrying capacity of the range.

- Utilization of key forage species will be limited to an average of 50 percent of the current year's growth (considering only areas identified for use in any given year).

Two basic grazing systems have been identified to fulfill the above requirements: (1) rest rotation, which incorporates at least a 1-year rest period per grazing cycle and (2) deferred rotation

TABLE 1-4
SCHEDULE FOR PREPARATION OF ALLOTMENT MANAGEMENT PLANS

Year 1	Year 2	Year 3
1. Grassie Mountain	1. Mesquite Community	1. East Belnap
2. Mud & Cane Spring	Mosby	Pa's Pocket
3., 4.		
Wolfhole Mountain	2. Littlefield Community	2. Wolfhole Lake
Cedar Wash	3. Penn's Well*	3. Mosby-Nay
Lambing	Dripping Spring	4. Mormon Well
Starvation Point	4. Pakoon Spring	5. Sunshine
Pocum Tank	5. Wildcat	6. Mustang Spring
5. Cottonwood	6. Wolfhole Canyon	7. Sullivan Tank
6. Blake Pond	Highway	8. Hidden & Sullivan
7. Tassi	Cedar Pockets	9. Home Ranch
8. Mule Canyon	Mine Valley	10. Jump Canyon
Belnap West	7. Diamond Butte	
9. Link Spring		
Last Chance		
10. Lizard*		

*SCS Cooperative Plan

grazing systems, which delay grazing on a portion of an allotment each year during the growing period and rotate this delay among the pastures. The only way 1 full year's rest can be attained is by applying this system to allotments proposed for less than yearlong use.

BLM would implement intensive management through AMPs. Each AMP would be based upon the multiple-use needs of the allotment and the pastures within the allotment. The levels of livestock grazing, period of use, and specific grazing system would be designed to meet objectives and to adequately protect the rangeland ecosystem within the allotment. Allotments would be required to meet these objectives before additional forage could be allocated to livestock. BLM Manual 4100 outlines the steps involved in the preparation of AMPs.

BLM would evaluate each AMP at the end of each grazing cycle, monitoring changes in plant density, composition, ground cover, and soil stability. Four studies are basic to such evaluation: actual grazing use, vegetation utilization, range condition and trend (soils and vegetation), and climate.

General Criteria for Selecting Intensive Grazing Systems and the Number of Pastures

BLM resource specialists (range conservationists, wildlife biologists, and watershed specialists) selected the type of grazing system and number of pastures to meet the needs of the various resources for the 40 allotments. They considered the following criteria in their selection:

- Allotment size and shape;
- Physiographic characteristics;
- Vegetation factors — present condition, production, present use, composition, physiological requirements, and estimated potential for improvement;
- Resource constraints and objectives, including composition, production, and degree of use;
- Sequence and timing of grazing to meet management objectives;
- Livestock handling requirements of the operator;
- Resource specialist professional judgment of system considered best adapted to achieve resource objectives;
- Type of grazing system proposed;
- Grazing period proposed (yearlong vs. seasonal); and
- Existing division of allotments.

Applying the above criteria, resource specialists selected the rest-rotation and deferred rotation grazing systems.

REST-ROTATION GRAZING

Rest-rotation grazing is proposed for 844,331 acres of Federal lands, involving 27,938 livestock AUMs. (See table 1-3 for allotments involved.) Rest rotation would be implemented on pastures nearly equally divided in forage production, each of which would be systematically grazed and rested over an entire grazing cycle.

Grazing systems that apply rest are designed to allow completion of plant growth, fulfillment of physiological requirements, and proper utilization of livestock forage. Regardless of the number of pastures involved, all systems would have scheduled grazing and resting sequences in common. Properly applied, rest-rotation grazing should improve plant vigor and increase desirable species composition.

The following criteria were used for selecting rest-rotation grazing systems:

- The need for long periods of rest to restore range condition, plant vigor, and vegetation cover;
- The need to tailor grazing system treatments to the physiological requirements of specific key management species (see table 2-4 for phenology of key species); and
- The need to manipulate vegetation communities to produce desirable species compositions within a relatively short time.

Table 1-5 outlines the basic treatment descriptions and sequence of rest-rotation grazing. The number of pastures receiving a prescribed treatment each year depends on the number of pastures in the allotments designated for rest-rotation grazing. Rest-rotation grazing systems already implemented in the EIS area are shown on table 1-3.

DEFERRED ROTATION

Deferred rotation delays grazing each year during the growing period on a portion of the allotment and rotates this delay among pastures

TABLE 1-5
GRAZING SYSTEM TREATMENT SCHEDULES

THREE-PASTURE REST-ROTATION TREATMENT SCHEDULE

Typical yearlong system

Years in grazing cycle	PASTURES		
	A	B	C
1	Graze yearlong March - Feb.	Graze Summer-Fall July - Feb.	Rest yearlong March - Feb.
2	Graze Summer-Fall July - Feb.	Rest yearlong July - Feb.	Graze yearlong March - Feb.
3	Rest yearlong March - Feb.	Graze yearlong March - Feb.	Graze Summer-Fall July - Feb.

FOUR-PASTURE REST-ROTATION TREATMENT SCHEDULE

Typical yearlong system

Years in grazing cycle	PASTURES			
	A	B	C	D
1	Graze Spring March - June	Graze Summer Graze Fall July - Oct.	Graze Winter Nov. - Feb.	Rest yearlong
2	Graze Summer Graze Fall July - Oct.	Graze Winter Nov. - Feb.	Rest yearlong	Graze Spring March - June
3	Graze Winter Nov. - Feb.	Rest yearlong	Graze Spring March - June	Graze Summer Graze Fall July - Oct.
4	Rest yearlong	Graze Spring March - June	Graze Summer Graze Fall July - Oct.	Graze Winter Nov. - Feb.

THREE-PASTURE DEFERRED ROTATION TREATMENT SCHEDULE

Typical Use: November 15 through May 15

Years in grazing cycle	PASTURES		
	A	B	C
1	Graze Winter thru Early Spring Nov. - March	Graze Spring April - June	Graze Winter thru Early Spring Nov. - March
2	Graze Spring April - June	Graze Winter thru Early Spring Nov. - March	Graze Winter thru Early Spring Nov. - March
3	Graze Winter thru Early Spring Nov. - March	Graze Winter thru Early Spring Nov. - March	Graze Spring April - June

TWO-PASTURE DEFERRED ROTATION TREATMENT SCHEDULE

Typical Use: November 15 through May 15

Years in Grazing cycle	PASTURES	
	A	B
1	Graze Winter thru Early Spring Nov. - March	Graze Spring April - June
2	Graze Spring April - June	Graze Winter thru Early Spring Nov. - March

NOTE: Pastures are resting when not scheduled for grazing.

during the cycle. It allows other areas of the range to benefit from deferment (Stoddart, Smith, and Box, 1975). When the deferment is sufficiently long and occurs during the growing season, range plants benefit. Even though moisture may be insufficient for full vegetative growth during such a deferment period, deferred rotation still relieves pressure from further deterioration of plants, including their root systems (Bell, 1973).

The deferred rotation system primarily involves winter-spring use of two or more pastures, at least one of which would be rested during the spring. The grazing deferral and rest sequences would be rotated among pastures similarly to rest rotation. The deferred rotation system is proposed for 21 allotments, involving 779,003 acres of Federal lands and 33,869 livestock AUMs. Table 1-3 identifies allotments proposed for deferred rotation.

Table 1-5 outlines the two- and three-pasture treatment schedules of deferred rotation grazing. The number of pastures receiving the prescribed treatment each year would depend on the number of pastures in the allotments designated for deferred rotation.

The deferred rotation system was selected for the following reasons:

- Allotment size, shape, or physiography limits management system options;
- The system would satisfy resource management objectives without long rest periods;
- The system allows the maintenance of range condition and plant vigor; and
- The system may be more compatible with rancher operations.

Continuous grazing was not chosen for these allotments because, unlike deferred systems, continuous grazing does not provide a pasture free of livestock grazing. Moreover, systematic rest provides for the physiological requirements of browse, whereas continuous grazing does not. The deferred rotation system also provides 1 year's rest for each pasture during a grazing cycle when incorporated with winter-spring use.

The deferred rotation grazing systems already implemented in the EIS area are shown on table 1-2.

LESS INTENSIVE MANAGEMENT OF LIVESTOCK GRAZING

Less intensive management is a reduced degree of management in which BLM regulates only livestock numbers, class of animal, and grazing season. It is proposed for 10 allotments, involving 77,696 acres of Federal lands and 2,498 AUMs. BLM resource managers used one or more of the following criteria to identify allotments and pastures suitable for less intensive management.

- The allotment provides less than 120 AUMs of forage.
- Conflicts with other resources were not identified in the inventory and planning process.
- Sixty percent of the area or more is not in Federal ownership or is in Federal ownership where other uses have priority over grazing.
- Range condition is good to excellent.
- Range management practices are satisfactory.
- Benefit/cost limitations exist, including cost of needed improvements, allotment sizes, and low carrying capacity and potential.

Less intensive management would require regular supervision by BLM, primarily to ensure compliance and evaluate resource conditions. Under less intensive management BLM would regulate livestock grazing on a range area, assuring that the trust guardianship and preservation of Federal land is upheld. BLM would issue permits specifying period of use, class of livestock, and AUMs available to livestock on Federal lands.

Less intensive management could continue as long as livestock grazing does not harm Federal lands. BLM proposes no specific objectives to implement less intensive management other than the use of existing developments and forage resources and the maintenance of resource conditions. BLM proposes no new range developments for areas under less intensive management.

Less intensive management would be implemented following the filing of the final EIS; implementation would be completed within 3 years.

EPHEMERAL GRAZING

During years of favorable precipitation many of the allotments in the EIS area produce good annual (ephemeral) forage, which livestock can use during the spring growing period without damaging perennial plants. The Grand Wash MFP suggests that all land in the EIS area under 3,600 feet would qualify as ephemeral range. During years of high annual production BLM would issue, if requested, supplemental licenses to livestock operators wanting to use this additional forage. Before issuing supplemental licenses, however, BLM would consider other resource values and possible impacts. If significant conflicts would result, BLM would not issue a supplemental license. See table 1-2 for the allotments involved.

IMPLEMENTATION SCHEDULE

The proposed AMPs would be implemented during a 5-year period as shown in table 1-6. Table 1-6 also lists AMPs by priority for implementation.

The following criteria were used to establish the priority for implementation of AMPs.

- Fragile land areas (soils and vegetation);
- Range and watershed condition;
- Conflicts with other resources (wildlife, watershed, recreation);
- Potential for improvement;
- Required improvements for implementation.

BLM has given highest priority to AMPs, identifying fragile land areas, poor range or watershed conditions, serious conflicts with other resources, or excellent potential for improvement. Since the willingness of an operator to cooperate further insures the success of an AMP, the Arizona Strip District considered this willingness in selecting priority AMPs. Those AMPs requiring the least improvement for implementation provide early benefits with minimal funding.

The following stages of implementation (listed in order) have been identified:

1. Adjust to initial livestock stocking rate within 3 years after filing the final EIS. Adjustments exceeding 20 percent may be made over a period not to exceed 3 years after the final decision.

2. Initiate studies and evaluations.

3. Develop waters.

4. Construct fences.

5. Implement grazing systems. (See table 1-6 for improvement completion schedule.)

6. Treat land. (Some AMPs may require land treatments before implementing the grazing system to balance pasture carrying capacities.)

7. Upon completion of construction, initiate a maintenance schedule for all improvements.

The proposed action's goal is to attain specific management objectives within 15 years after implementation.

RANGE DEVELOPMENTS

Range Improvements

To implement intensive grazing management, additional range improvements are usually needed. Additional fences are needed to hold livestock in specific areas or pastures to apply rotational grazing systems. Additional water sources are also needed to provide dependable water in all pastures. In addition, land treatments proposed in the MFP and AMPs will incorporate the treatment areas to balance carrying capacities among pastures. The proposed three-pasture deferred rotation grazing system on the Blake Pond allotment, for example, would require 3 miles of new fence and two new water developments.

Implementing grazing systems would require installing fences and developing waters. Since AMPs have not been prepared, exact numbers and types of improvements cannot be projected. Typical water developments would include pipelines, springs, wells, troughs, reservoirs and catchments. Land treatments, such as chaining pinyon and juniper and spraying or plowing of sagebrush, would increase production and improve range conditions. Although land treatment is expected to increase the range's carrying capacity, the resulting additional AUMs of forage would not be allocated until seedings are established and ready for use. All new or proposed seedings would be rested at least 2 full years for seedling establishment. Locations of existing improvements are shown on plate 1.

Table 1-6 presents an approximate number of water developments and miles of fence needed to implement the proposed AMPs. It also includes approximate costs, acres disturbed in the long and short term, a chronological breakdown of construction, and miles of two-track

TABLE 1-6
RANGE IMPROVEMENTS: COSTS, DISTURBANCE, AND IMPLEMENTATION SCHEDULE

Construction Schedule	Allotment	Type of Improvement	Units	Approximate Improvement Cost	Acreage Disturbed Short Term	Acreage Disturbed Long Term	Approximate Two-Track Road Mileage Long Term
Year 1	Cottonwood	Water developments	2 each	14,300	1.2	0.6	
		Fences	7 miles	15,400	3.5	0.7	
		Land treatment					
		Chaining	1,480 acres	29,600	1,480		
		Seeding	1,480 acres	26,640			
		Total		85,940	1,484.7	1.3	0.5
	Grassie Mountain	Water developments	6 each	42,900	3.6	1.0	
		Fences	8 miles	17,600	4.0	0.8	
		Land treatment					
		Chaining	19,550 acres	391,000	19,550		
		Disc or plow	7,680 acres	153,600	7,880		
		Seeding	27,230 acres	490,140			
		Total		1,095,240	27,437.6	1.8	3.0
	Mud and Cane	Water developments	5 each	35,750	3.0	1.5	
		Fences	10 miles	22,000	5.0	1.0	
		Land treatment					
		Chaining	4,160 acres	83,200	4,160		
		Burning	5,760 acres	57,600	5,760		
		Seeding	9,920 acres	178,560			
		Total		377,110	9,928.0	2.5	2.0
	Sullivan Canyon	Land treatments					
		Chaining	3,120 acres	62,400	3,120		
		Seeding	3,120 acres	56,160			
		Total		118,560	3,120.0		
TOTAL FOR YEAR 1				1,676,850	41,970.3	5.6	5.5
Year 2	Black Rock	Water developments	2 each	14,300	1.2	0.6	
		Fences	1.2 miles	2,640	0.6	0.1	
		Land treatments					
		Chaining	2,400 acres	48,000	2,400		
		Burning	2,840	28,400	2,840		
		Seeding	5,240	94,320			
		Total		187,660	5,241.8	0.7	0.3
	Blake Pond	Water developments	2 each	14,300	1.2	0.6	
		Fences	3 miles	6,600	1.5	0.3	
		Land treatment					
		Disc or plow	1,000 acres	20,000	1,000		
		Seeding	1,000 acres	18,000			
		Total		58,900	1,002.7	0.9	1.2
	Last Chance & Link	Water developments	3 each	21,450	1.8	0.9	
		Fences	6 miles	13,200	3.0	0.6	
		Total		34,650	4.8	1.5	0.9
	Mesquite Community	Water developments	3 each	21,450	1.8	0.9	
		Fences	13 miles	28,600	6.5	1.3	
		Total		50,050	8.3	2.2	1.5
	Mule Canyon	Water developments	2 each	14,300	1.2	0.6	
		Fences	2 miles	4,400	1.5	0.3	
		Total		18,700	2.7	0.9	0.7
	Tassi	Water developments	3 each	21,450	1.8	0.3	
		Fences	15 miles	33,000	7.5	1.5	
		Total		54,450	9.3	1.8	4.0
	Parashaunt	Water developments	6 each	42,900	3.6	1.8	
		Land treatments					
		Chaining	6,400 acres	128,000	6,400		
		Seeding	6,400 acres	115,200			
		Total		286,100	6,403.6	1.8	2.0
	Wolfhole Mountain	Water developments	4 each	28,600	2.4	1.2	
		Fences	5 miles	11,000	4.5	0.5	
		Land treatment					
		Chaining	5,400 acres	108,000	5,400		
		Burning	2,800 acres	28,000	2,800		
		Disc or plow	720 acres	14,400	720		
		Seeding	8,920 acres	160,560			
		Total		350,560	8,926.9	1.7	1.2
TOTAL FOR YEAR 2				1,041,070	21,600.1	11.5	11.8
Year 3	Littlefield Comm.	Water developments	2 each	14,300	1.2	0.6	
		Fences	14 miles	30,800	8.4	1.4	
		Total		45,100	9.6	2.0	3.5
	Little Tank	Water development	1 each	7,150	0.6	0.3	
		Total		7,150	0.6	0.3	0.2
	Mt. Trumbull	Water developments	2 each	14,300	1.2	0.6	
		Total		14,300	1.2	0.6	0.2
	Pakoon Spring	Water developments	5 each	35,750	3.0	1.5	
		Fences	7 miles	15,400	3.5	0.7	
		Total		51,150	6.5	2.2	1.2
	Penns Well	Fences	2 miles	4,400	1.0	0.2	
		Total		4,400	1.0	0.2	0.1

TABLE 1-6 (continued)

Construction Schedule	Allotment	Type of Improvement	Units	Approximate Improvement Cost	Acreage Disturbed		Approximate Two-Track Road Mileage
					Short Term	Long Term	Long Term
Year 3 (cont.)	Wildcat	Water developments	10 each	71,500	6.0	3.0	
		Fences	8 miles	17,600	4.0	0.8	
		Land treatments					
		Chaining	17,000 acres	340,000	17,000		
		Burning	6,250 acres	62,500	6,250		
		Disc or plow	3,900 acres	78,000	3,900		
		Seeding	27,150 acres	488,700			
		Total		1,058,300	27,160.0	3.8	2.4
	Wolfhole Canyon	Water developments	3 each	21,450	1.8	0.9	
		Fences	3 miles	6,600	1.5	0.3	
		Land treatment					
		Disc or plow	3,400 acres	68,000	3,400		
		Seeding	3,400 acres	61,200			
		Total		157,250	3,403.3	1.2	0.8
TOTAL FOR YEAR 3				1,337,650	30,582.2	10.3	8.4
Year 4	Clay Spring	Water development	1 each	7,150	0.6	0.3	
		Total		7,150	0.6	0.3	0.1
	Duncan Tank	Fence	0.5 mile	1,100	0.2	0.1	
		Total		1,100	0.2	0.1	0.1
	Jackson Tank	Water development	1 each	7,150	0.6	0.3	
		Total		7,150	0.6	0.3	0.2
	Jump Canyon	Water developments	2 each	14,300	1.2	0.6	
		Land treatment					
		Chaining	11,600 acres	232,000	11,600		
		Seeding	11,600 acres	208,800			
		Total		455,100	11,601.2	0.6	0.3
	Lizard	Water developments	2 each	14,300	1.2	0.6	
		Fences	3 miles	6,600	1.5	0.3	
		Total		20,900	2.7	0.9	0.4
	Mormon Well	Water developments	2 each	14,300	1.2	0.6	
		Fences	5 miles	11,000	2.5	0.5	
		Total		25,300	3.7	1.1	0.6
	Mosby-Nay	Water developments	4 each	28,600	2.4	1.2	
		Fences	6 miles	13,200	3.0	0.6	
		Total		41,800	5.4	1.8	1.0
TOTAL FOR YEAR 4				558,500	11,614.4	5.1	2.7
Year 5	Hidden & Sullivan	Water developments	4 each	28,600	2.4	1.2	
		Fences	4 miles	8,800	2.0	0.4	
		Total		37,400	4.4	1.6	1.0
	Ivanpah	Water development	1 each	7,150	0.6	0.3	
		Total		7,150	0.6	0.3	0.2
	Mainstreet	Water developments	4 each	28,600	2.4	1.2	
		Fence	6 miles	13,200	3.0	0.6	
		Land treatments					
		Chaining	4,450 acres	89,000	4,450		
		Disc or plow	4,200 acres	84,000	4,200		
		Seeding	8,650 acres	155,700			
		Total		370,500	8,655.4	1.8	2.0
	Pa's Pocket	Water developments	2 each	14,300	1.3	0.6	
		Fences	3 miles	6,600	1.5	0.3	
		Land treatment					
		Chaining	2,120 acres	42,400	2,120		
		Seeding	2,120 acres	38,160			
		Total		101,460	2,122.8	0.9	0.3
	Poverty Mountain	Land treatment					
		Chaining	3,960 acres	79,200	3,960		
		Disc or plow	4,200 acres	84,000	4,200		
		Seeding	7,160 acres	128,880			
		Total		292,080	8,160		
	Sullivan Tank	Water development	1 each	7,150	0.6	0.3	
		Fences	4 miles	8,800	2.0	0.4	
		Total		15,950	2.6	0.7	0.4
	Sunshine	Water development	1 each	7,150	0.6	0.3	
		Fences	1.3 miles	2,860	0.7	0.1	
		Total		10,010	1.3	0.4	0.2
	Wolfhole Lake	Land treatment					
		Chaining	4,120 acres	82,400	4,120		
		Seeding	4,120 acres	74,160			
		Total		156,560	4,120	0.0	0.0
TOTAL FOR YEAR 5				991,110	23,067.1	5.7	4.1
GRAND TOTALS				5,605,180	128,834.1	38.2	32.5

road needed for the construction of improvements. Table 1-7 summarizes proposed improvements and acreage temporarily disturbed and permanently committed.

These approximations are based on an analysis of AMPs implemented in the Arizona Strip District. Land treatment acreages were taken from the Grand Wash MFP.

Design Restrictions

BLM will adhere to the following restrictions in designing and building improvements in the Shivwits EIS area.

1. Permanent two-track roads will be constructed only when necessary.

2. Projects will disturb soil and vegetation as little as possible (BLM policy; BLM Manual 8400).

3. Disturbed soil will be finished to blend into the surrounding soil surface and reseeded as needed with a mixture of native or introduced species to replace ground cover and reduce soil loss from wind and water erosion (BLM policy; BLM Manual 8400).

4. Archaeological clearance will be required for all project sites before new construction. Intensive surveys will be conducted to locate any cultural or paleontological remains. If such remains are discovered, the project will be relocated or redesigned to avoid the remains. If the project cannot be moved, a mitigative data recovery or salvage program will be completed before construction. Construction permits will stipulate protection for buried resources and provide additional surveys should project locations be changed. (BLM policy; National Historic Preservation Act of 1969; Executive Order 11593; 36 CFR Part 800.)

5. Plant species proposed for threatened or endangered status will be surveyed for each project site before construction. If range improvements would diminish the value of the habitat for any such species found the project will be relocated or abandoned (Arizona BLM policy).

6. An endangered animal clearance will be required before any construction can be started. If threatened or endangered species are found, BLM will consult with the U.S. Fish and Wildlife Service (FWS) and take the appropriate action, which might include protective mitigation or relocation or abandonment of the project. (BLM Manual 6840; Endangered Species Act of 1973.)

7. A visual resource contrast rating will be conducted for all project sites before construction. (BLM policy; BLM Manual 6300.) Projects that would impair visual resources will be modified by design, relocation, or abandoned if necessary to meet visual resource management class objectives.

8. All water developments will be constructed to allow wildlife safe, unrestricted use of the facility. Such design features will include separate drinking facilities at ground level, which may be fenced for the exclusive use of wildlife. Waters will not be turned off except to prevent freezing or malfunction.

9. The wilderness inventory required by Section 603 (a) of the Federal Land Policy and Management Act (FLPMA) has not been completed on public lands that would be impacted by the proposal. Before implementing any action that could impair suitability for wilderness, BLM will have to inventory areas suitable for wilderness and assess impacts on potential or existing wilderness. Until Congress acts on an area that has been proposed for wilderness, existing multiple-use activities can continue, subject to interim management policy. New uses or expanded existing uses will be allowed only if the impacts do not impair the suitability of the area for wilderness designation.

10. New fences in mule deer and pronghorn antelope habitat will be constructed to meet BLM specifications to protect these animals. Existing fences in such habitat will be modified to meet the specifications. Specifications include:

Overall Height (mule deer and antelope) =
42″

Wire Spacing (mule deer and antelope) =
16″ ground to first wire
6″ first wire to second
8″ second to third
12″ third to top

Type of Wire (antelope) =
Bottom wire smooth

11. Riparian areas determined to need protection to maintain wildlife habitat, aesthetics, and water quality will be fenced. Fencing of riparian areas would be completed within the 5-year period established for completion of range improvements.

12. Reservoirs that hold water 80 percent of the year and that can be shown to provide for the habitat needs of wildlife in the immediate area will be fenced.

13. Desert tortoise habitat will be protected by resting tortoise concentration areas from spring livestock grazing, by providing livestock

TABLE 1-7
SUMMARY OF PROPOSED DEVELOPMENTS AND ACRES DISTURBED
(Approximate)

Improvements	Number	Unit	Acres Disturbed/ Unit (Average)	Total Acres Temporarily Disturbed	Total Acres Permanently Committed
Water Developments	86	No.	0.6	51.6	25.8
Fences	137	Miles	0.5	68.5	13.7
Total				120.1	39.5
Land Treatments					
Chaining	85,760	Acres	85,760	85,760	85,760
Burning	17,650	Acres	17,650	17,650	17,650
Disc or Plow	25,100	Acres	25,100	25,100	25,100
Seeding	128,510	Acres	--	--	--
Total			128,510	128,510	128,510
Two-Track Road	32.5	Miles	0.5	16.3	16.3
TOTAL				128,646.4	128,565.8

waters no closer than 1 mile from concentration areas, and if necessary by fencing washes containing a high concentration of tortoises.

14. BLM will determine seeding mixtures on a site-specific basis, using seeding studies conducted by the University of Arizona on the Arizona Strip. Resource specialists will consider wildlife, watershed, range, and other resource needs in formulating seed mixtures. Typical mixtures might include pubescent wheatgrass, Russian wildrye, crested wheatgrass, yellow sweetclover, Ladak alfalfa, fourwing saltbush, bitterbrush, and cliffrose.

15. Prescribed fires will be planned with specific goals and objectives, under prescribed constraints that will assure minimum damage to plant cover and soil. They will be scheduled for a period in the spring when new plant growth is under 2 inches on grasses and in fall when root reserves are at near spring levels after initial fall rains.

(a) Soil must be moist.

(b) Wind speed minimum — 8 miles per hour, maximum — 20 miles per hour.

(c) Fine fuel moisture: 10–30 percent.

(d) Relative humidity: 20–60 percent.

Prescribed fire for pinyon-juniper will be scheduled between May and October when conditions are adequate to carry fire in the pinyon-juniper fuel type.

(a) Fuel moisture using ½ inch ponderosa pine fuel sticks: 7-15 percent.

(b) Wind: 6-15 miles per hour.

(c) Relative humidity: 10-30 percent.

(d) Maximum temperature: 90°F.; minimum temperature: 50°F.

To control fire where natural barriers cannot be used, firelines will be constructed by handline methods or using tractors with blades. The width of firelines will be restricted to 3 to 8 feet, depending on fuel type and arrangement. Firelines will be reseeded and water barred to prevent erosion. Weather will be carefully monitored before and during burns to assure adherence to prescription constraints.

16. Before any construction BLM will prepare a site-specific environmental assessment to analyze environmental impacts.

Maintenance

Various procedures will be followed to maintain the existing and proposed range improvements. BLM will periodically inspect water developments each year and perform preventive maintenance to ensure that they remain in usable condition.

MONITORING PROGRAMS

The proposed action provides for the following resource evaluation studies.

Trend

Trend studies, according to BLM Manual 4412.22c, will be conducted in areas at each pasture before implementing grazing systems and during each grazing cycle. The studies will be used to determine browse condition, watershed erosion, and vegetation condition and trend. (See appendix 1-1).

Utilization

During and after each pasture is grazed, utilization of forage will be measured by the key species method described in BLM Manual 4412.22b. Utilization studies aid in determining whether stocking rates are at proper levels.

Wildlife Studies

Studies to monitor wildlife habitat conditions will continue, including exclosure, utilization cages, vegetation transects, and seeding plots. Population trends of both game and nongame species will also be studied. Studies will be conducted year round, the time of year depending on the species and habitat being evaluated. These data will be used to determine trends in wildlife numbers and habitat conditions to insure the meeting of wildlife objectives.

Actual Use

Each operator will complete BLM Form 4412-B and file it with the District at the end of the grazing season. This report will show how many cattle grazed a particular pasture and for what period of time. From this information the actual forage use in AUMs can be calculated for each pasture and for each allotment. (See table 1-3 for maximum allowable use.)

Weather Studies

Weather studies are conducted regularly and consist of reading and maintaining precipitation gauges across the resource area. Nineteen precipitation gauges have been established at representative sites throughout the EIS area.

AMP MODIFICATION

At the end of each grazing cycle BLM will complete the AMP evaluation procedures in BLM Manual 4113 to determine if the AMP is meeting its objectives. If not, the AMP will be revised. Such revisions might include changes in the grazing system, livestock numbers, or period of use; increases in range developments; or any combination of the preceding measures.

Before implementation, major AMP changes will require an environmental assessment record (EAR). In addition, the area manager would adjust grazing systems during drought or other emergencies when such adjustments would help achieve the objectives. Depending upon the situation, the area manager would determine the time to be allowed for adjustments.

At the end of each grazing cycle, a multidisciplinary team of resource specialists will assemble all study data to evaluate the effectiveness of the grazing system and determine the need for any adjustment in the system or stocking rate. The following examples demonstrate how study data are used in stocking rate adjustment calculations.

	Allotment A	**Allotment B**
Climate	Normal precipitation	Normal precipitation
Trend	Cover down 5%	Cover up 10%
	Key species down 5%	Key species up 5%
Utilization	80%	35%
Actual Use	600 AUMs/Year	400 AUMs/Year

Allotment A shows a downward trend, indicating that numbers must be adjusted to reduce utilization. Following is the formula (BLM Manual 4413.3) used to calculate the adjusted stocking rate necessary to achieve a desired level of utilization:

$$\frac{600 \text{ AUMs}}{80\%} = \frac{x}{50\%} \qquad x = 375 \text{ AUMs}$$

Allotment B shows an upward trend, permitting an increase in stocking rate up to 50 percent utilization. Again the formula is used to determine the adjustment.

$$\frac{400 \text{ AUMs}}{35\%} = \frac{x}{50\%} \qquad x = 574 \text{ AUMs}$$

Resource specialists will periodically visit allotments under less intensive management to conduct on-the-ground inspections to determine changes in resource conditions. If this monitoring identifies problems or conflicts, the allotment will be evaluated for a change in management. If studies show a need for adjusting utilization, the preceding formula will be used to determine new levels.

ADMINISTRATION

BLM would issue grazing permits according to the Federal Land Policy and Management Act (FLPMA) and according to land use plans that provide for multiple-use management and protection of the environment.

Each livestock operator would be issued a 10-year term permit, which would specify the conditions of authorized grazing on the allotment. Where an AMP has been prepared it will be included in the term permit.

Each AMP will outline a given amount of normal flexibility in livestock numbers and movement dates the operator may exercise without prior BLM approval. This flexibility could allow the operator to move livestock on or off an allotment or pasture up to 2 weeks before or after the scheduled dates. It could also allow up to a 10 percent increase in livestock numbers. The 2-week and 10 percent adjustments will be included in the initial stocking rate as shown in table 1-3. In no case, however, will the normal use plus the normal flexibility exceed the initial stocking rate.

Normal flexibility allows the operator to adjust to climatic fluctuations such as high or low production, availability of water, early or late range readiness, and variations in ranching operations.

BLM would supervise livestock grazing throughout the year. If the livestock operator wishes changes in use outside the limits of normal flexibility but consistent with management objectives (changes in the normal operation livestock numbers and dates without prior BLM approval), he would formally request authorization for the deviation in advance of use.

Intensive grazing management also requires BLM approval for deviation of range use beyond flexibility limits. Because the EIS area is semiarid and subject to wide annual and geographical fluctuations in precipitation, stocking rates and use periods may need to be altered to meet management objectives. Rates and periods may be increased or decreased on the basis of studies, range condition, competition with wildlife, amount of available forage and water, and time of year. Utilization will never be allowed to exceed an average of 50 percent in the use pastures.

Any deviations from the grazing schedule outside normal flexibility must receive BLM's prior approval. Achieving AMP multiple-use objectives, protection of vegetation and soil, and livestock-wildlife competition will be prime concerns in considering any changes in the grazing schedule.

Adjustments will be made to

- Authorize the movement of livestock from one pasture to another ahead of schedule, due to lack of forage in the first and the presence of forage in the second.
- Hold livestock in a pasture longer than scheduled, if utilization has not reached 50 percent. This option could only be used when forage is lacking in the next use pasture or to obtain some stage of vegetative development such as seed ripe.
- Allow use in the "rest" pasture if it has abundant forage while, because of rainfall patterns, forage is temporarily lacking in the "graze" pastures.
- Reduce livestock numbers in response to a lack of forage production in any season or growing year.
- Allow movement of livestock from one pasture to another ahead of schedule if sufficient water is lacking in the scheduled pasture and resource managers determine that objectives of the plan can be met. Present requirements for base waters will not be relaxed.
- Temporarily increase or decrease livestock numbers to achieve predetermined utilization. For example, if achieving a degree of hedging on browse species is desirable to benefit wildlife habitat, a temporary increase in livestock numbers may be warranted.

Operators of allotments under less intensive grazing that want a change from grazing outlined in their licenses would formally request the change and may obtain approval in advance.

Grazing outside the limits outlined in the AMPs or annual license and without prior authorization would be considered trespass. Should trespass occur, BLM would act to assure that it is eliminated and that those responsible pay for forage consumed and damages incurred.

Trailing needs would vary with each operation. Some livestock would trail to and from allotments, whereas others would simply trail between pastures. Most trailing would occur during licensed or authorized periods. An average of two crossing permits would be issued to operators moving livestock from Utah to Arizona and from Arizona to Nevada. The EIS area has approximately 76 miles of infrequently used administrative stock driveways (plate 1).

MANPOWER REQUIRED

To implement and monitor the proposed action, seven additional positions would be required: two engineering technicians for project development, two maintenance persons, and three range technicians.

RELATED ACTIONS

The following actions would be required to implement the proposed action.

Federal Action

Any range improvement projects proposed on the Grand Canyon National Park and Lake Mead National Recreation Area would require National Park Service approval before construction.

County Action

Before installing any project affecting county roads, such as fences, cattleguards, and pipelines, clearance will be required from the Mohave County Commission.

ALTERNATIVES TO THE PROPOSED ACTION

This section briefly describes the alternatives to the proposed action. (See table 1-3.) A comparison of long-term major impacts of the proposal and these alternatives appears in table 1-8.

TABLE 1-8

COMPARISON OF LONG-TERM MAJOR IMPACTS OF THE PROPOSAL AND ALTERNATIVES

Environmental Element	Unit	Present Status	Proposed Action	Alternative 1 Full Stocking	Alternative 2 Stocking by Condition Class	Alternative 3 No Vegetation Manipulation	Alternative 4 No Action	Alternative 5 Elimination of Grazing
Vegetation								
Range Condition	Acres							
Good		263,802	568,156	438,356	570,846	439,646	315,448	439,646
Fair		538,745	414,565	488,635	414,576	414,565	487,102	414,565
Poor		1,046,348	866,174	921,904	863,473	994,684	1,046,345	994,684
Production	Pounds*	84 million	100 million	96 million	107 million	92 million	84 million	82 million
Soils								
Disturbance	Acres	31,583	130,855	130,855	130,855	2,345	31,583	65
Sediment Loss	Ac.Ft./Year	881.4	815	844	802.2	862.8	1,003.5	765.1
Critical or Severe Erosion Condition	Acres	55,831	17,786	23,832	17,786	23,832	103,839	17,113
Wildlife								
Mule Deer	Acres	Unknown						
Improve			387,850	281,103	665,516	665,558	132,675	763,663
Decline			20,120	225,047	20,157	20,120	618,913	0
Static			8,986	8,986	8,986	8,986	0	0
Pronghorn Antelope	Acres	Unknown						
Improve			182,969	182,339	208,733	208,733	148,506	212,251
Decline			23,817	50,211	23,817	23,817	68,241	0
Static			4,494	4,494	4,496	4,496	0	0
Desert Bighorn	Acres	Unknown						
Improve			95,629	16,836	95,629	95,629	14,486	197,197
Decline			8,791	44,016	8,791	8,791	108,299	0
Static			11,213	11,213	11,213	11,213	0	0
Desert Tortoise	Acres	Unknown						
Improve			133,530	36,903	133,530	133,530	30,140	206,744
Decline			66,290	162,917	66,290	66,290	169,680	0
Static			0	0	0	0	0	0
Nongame	Acres	Unknown						
Improve			1,056,522	231,809	1,056,522	1,169,448	599,717	1,644,364
Decline			262,040	864,101	262,040	149,114	1,248,876	0
Static			101,181	100,911	101,181	101,181	0	0
Riparian	Acres	Unknown	Static	Decline	Static	Static	Decline	Improve
Livestock Grazing	AUMs	83,940	86,527	94,181	93,610	73,143	108,739	0
Calf Crops	Change %		+ 15	+ 5	+ 15	+ 10	- 10	-
Calf Weaned Weights	Change Pounds		+ 35	+ 17	+ 40	+ 28	- 15	-
Cull Cow Weights	Change Pounds		+ 72	+ 30	+ 90	+ 45	- 90	-
Death Loss	Change %		- 25	0	- 25	- 20	+ 50	-
Economics								
Income from Livestock	$ Change from present	-	+300,000	+64,000	+457,000	-61,000	-323,000	-717,000
Revenue (BLM)	$ Change	-	- 11,000	+ 3,900	+ 1,200	-33,300	No change	-158,700
Social Conditions								
Attitudes and Values		Conflict between different publics and BLM	Decrease in conflicts	Decrease in conflicts	Decrease in conflicts	Decrease in conflicts	Continued conflict between different publics and BLM	Significant increase in conflicts
Rancher Lifestyle		Existing lifestyle (See affected environment)	Lifestyle somewhat jeopardized	Lifestyle somewhat jeopardized	Lifestyle moderately jeopardized	Lifestyle somewhat jeopardized	No change	Lifestyle significantly jeopardized

* Pounds of usable air dry forage

ALTERNATIVE 1: FULL STOCKING WITH MANAGEMENT

Alternative 1 would allow stocking at the estimated livestock carrying capacity for each allotment (as shown in table 1-3), permitting the livestock use of 77,012 AUMs of forage, 12,707 AUMs more than under the proposed action. Otherwise, livestock management would not change from that under the proposed action, nor would grazing systems, period of use, class of livestock, combinations of allotments, and range improvements used in the development and implementation of AMPs. This alternative differs from the proposed action in that it does not propose a reduction for the rest pasture in rest-rotation grazing systems.

The full stocking alternative is proposed because (1) it would cause less economic hardship on the local livestock industry than the proposed action in that smaller reductions would occur on allotments designated for rest-rotation grazing and (2) it would retain all range improvements and grazing systems of the proposed action but would require a smaller reduction in livestock numbers than the proposed action. This alternative would also be more likely to gain the support of livestock operators than the proposed action.

ALTERNATIVE 2: STOCKING LEVEL BY CONDITION CLASS

The stocking level by condition class alternative would set the stocking level in relation to the average condition and apparent trend of the allotments. This alternative would allow ranges in poor or fair condition to recover faster than they would under the proposed action, since maximum use would not exceed 30,361 AUMs for the EIS area.

The stocking level by condition class alternative is proposed because its required lower utilization would (1) allow a more rapid improvement of range conditions in subtypes subject to change than would the proposed action and (2) more successfully reduce conflicts between livestock management and wildlife and watershed than the proposed action.

The following criteria would be used for setting the initial stocking levels:

A. Condition good, apparent trend stable or up—the initial stocking rate would be the same as under the proposed action. Utilization of key forage species would average 50 percent.

B. Condition fair, apparent trend up or condition good and apparent trend down—the initial stocking rate would be 80 percent of that under the proposed action. Expected utilization of key forage species would average 40 percent.

C. Condition poor, apparent trend up or condition fair, apparent trend stable or down—the initial stocking rate would be 60 percent of that under the proposed action. Expected utilization of key forage species would average 30 percent.

D. Condition poor, apparent trend stable or down—grazing would be deferred for at least 5 years.

Table 1-3 presents the initial livestock stocking rates by allotment and compares the provisions of the proposed action and its alternatives.

The proposed AMPs would be implemented as scheduled, except on allotments deferred from grazing.

Resource specialists would analyze all allotments at the end of each grazing cycle and raise rates only when studies show an improvement in condition and apparent trend.

ALTERNATIVE 3: NO VEGETATION MANIPULATION

The no vegetation manipulation alternative would implement all provisions of the proposed action except land treatment, developing the proposed AMPs without the additional forage anticipated from land treatment. All increases in carrying capacity would come from natural potential. (See table 1-3.)

This alternative is proposed because (1) in the short term it would be more economical than the proposed action to implement and (2) it could be implemented faster than the proposed action, since it would require no waiting period for treatments and seeding.

ALTERNATIVE 4: NO ACTION

The no-action alternative proposes no change in grazing from the present. Livestock stocking rates would be limited to the recognized active privileges, 108,749 AUMs, and period of use identified in table 1-2. The 16 AMPs already implemented would continue in operation. Allotments under AMPs would be monitored and AMPs modified as needed to reach management objectives. (See table 1-3.)

No new range improvements would be authorized except those needed for the orderly use of the range, those needed to replace or maintain existing facilities, and those needed to fully implement the existing AMPs. Other resource programs would be managed to meet MFP objectives.

ALTERNATIVE 5: ELIMINATION OF GRAZING ON FEDERAL LANDS

Alternative 5 would eliminate livestock grazing on the Federal lands in the EIS area. Grazing trespass would be controlled by range use supervision and extensive fencing to separate private and State lands from the public land. Arizona State law would require BLM to survey and fence approximately 423 miles of State and private land boundaries to prevent livestock trespass on public land. Existing range improvements on Federal land not benefiting or supporting multiple-use management would be removed and the surface disturbance rehabilitated. (See table 1-3).

Elimination of grazing on Federal land is proposed because (1) it would allow for a rapid short run improvement in range condition and (2) it would eliminate conflicts between livestock and watershed protection and wildlife.

INTERRELATIONSHIPS

BLM's management of public lands in the EIS area is related to projects or management practices of other Federal agencies, State agencies, and, to a limited extent, private enterprise.

Because BLM manages such a large percentage of the lands in the Arizona Strip, its management practices strongly influence State and private lands interspersed within public lands. Close coordination between the various land managing agencies is required to accomplish goals and avoid resource use conflicts.

BLM PLANNING

Specific objectives found in the Grand Wash MFP and used as a basis for developing the proposed action are shown in table 1-9.

RELATIONSHIPS TO OTHER FEDERAL PROGRAMS

Utah and Nevada BLM

The BLM Cedar City District and the Arizona Strip District have signed an interdistrict agreement for range management along the Arizona-Utah boundary from the Nevada border to the easternmost edge of the Arizona Strip. This agreement permits an exchange of jurisdiction of three Utah allotments to Arizona management and one Arizona allotment to Utah management as follows:

To Utah Management:	To Arizona Management:
Fort Pierce - 13,861 acres	Cedar Pockets - 8,756 acres
	Mine Valley - 6,379 acres
	Starvation Point - 855 acres

The Las Vegas District and the Arizona Strip District have also signed an interdistrict agreement for the Arizona-Nevada boundary from the Utah State line to Lake Mead. This agreement gives the Arizona Strip District grazing management responsibility for two allotments that extend into the Las Vegas District: Mesquite Community and Blackwillow-Tassi Spring allotments. Management of grazing on these allotments, however, requires coordination, since grazing management interrelates with multiple-use planning, policies, and other programs.

National Park Service (NPS)

The Arizona Strip District and NPS have signed a memorandum of understanding (dated November 8, 1971) relating to grazing in Lake Mead National Recreation Area. The memorandum places grazing administration with BLM and outlines coordination and cooperation procedures between the two agencies on all matters related to grazing on NPS lands.

The following allotments and acreage are involved in the NPS agreements:

Blackwillow-Tassi	48,944.81 acres
Parashaunt	23,383.96 acres
Home Ranch	57,965.58 acres
Dripping Spring	16,093.52 acres
Mule Canyon	19,857.36 acres
Mt. Trumbull	17,589.36 acres
Pa's Pocket	7,897.44 acres
Grassie Mountain	10,569.16 acres

TABLE 1-9
MFP RECOMMENDATIONS AFFECTING THE PROPOSED ACTION

LIVESTOCK MFP 1	OTHER RESOURCES MFP 1 (CONFLICTING WITH LIVESTOCK)	MFP 1 CONFLICTS	MFP 2 RECOMMENDATIONS	RESOURCE TRADE-OFFS
	Wildlife			
1. Implement allotment management plans on 37 allotments in the Grand Wash Planning Unit. A full year's rest should be provided during each grazing cycle on each part of the allotment except for ephemeral-perennial allotments.	1a Eliminate livestock grazing in the Virgin Mountains above 2,600 feet.	Wildlife is proposing a reintroduction of bighorn sheep into the Virgin Mountains. Sheep do not compete successfully with domestic livestock for food and water. Livestock proposes implementing a grazing system on the Virgins and allocating forage there for livestock.	Removal of livestock grazing will be based on range suitability criteria.	Cattle will be removed from those portions of the Virgin Mountains found unsuitable for livestock grazing. Bighorn sheep may receive limited competition from livestock for food and water.
Provide livestock management by season-long grazing during dormant periods on allotments not suited for grazing systems. Allocate livestock forage on grazing allotments.	1b Remove livestock grazing from the riparian zone along the Virgin River.	Forage has been allocated and grazing systems proposed for livestock grazing on allotments along the Virgin River. Livestock graze cottonwood and willow seedlings and compact soils around desert willow and mesquite trees. These actions impact development of riparian habitat.	Allocate forage to livestock and wildlife and initiate intensive grazing management in all allotments along the Virgin River by 1982. Following the study scheduled for the Virgin River, remove livestock grazing from those areas where it is determined that livestock are causing serious and significant damage to the riparian zone.	An undetermined number of acres may be removed from livestock grazing in the riparian zone along the Virgin River by 1984 after completion of a habitat study.
	Recreation			
	1c Remove livestock grazing from the Paiute Primitive Area.	An AMP is proposed and livestock forage allocated on the allotment covering the Paiute Primitive Area. Livestock have destroyed vegetation around springs. Manure around primitive campsites is also objectionable to recreationists.	Removal of livestock will be based on range suitability criteria. Significant springs will be fenced.	Livestock will continue to graze portions of the Paiute Area. An undetermined number of AUMs will be lost for livestock grazing through fencing of significant springs and the application of range suitability criteria.
	Wildlife			
2. Grazing may be allowed during spring growth of annuals on those allotments classified as ephemeral-perennial ranges.	2a Prohibit livestock grazing from April 1 through November 1 on desert tortoise habitat in the Pakoon and Beaver Dam Slope.	Both the Pakoon and Beaver Dam Slope are classified as ephemeral-perennial range.	Maintain a 50 percent or less utilization level on perennial grasses and key shrubs, allocate forage for tortoises, fence washes containing high tortoise concentrations or provide spring rest in pastures containing high concentrations of tortoises. Provide livestock water no closer than 1 mile from tortoise concentration areas.	Annual forage production will go unutilized during the spring growing season in rest pastures. An unidentified amount of livestock forage will be excluded from use where washes are fenced. Livestock will continue to utilize tortoise habitat during the spring.
	Recreation			
3. Increase forage production in certain allotments by chaining pinyon-juniper, plowing sagebrush, and then reseeding these areas. If fire will carry, these sites as well as blackbrush sites may be burned instead of chained or plowed.	3a Provide opportunity for pinyon nut collecting by retaining the pinyon-juniper stands identified on Recreation URA Step 4 overlay.	Some areas identified for chaining encompass or are part of areas identified as pinyon nut collection sites.	Chainings conducted on areas identified as pinyon nut collection sites will be landscaped so as to provide islands of unchained trees where a high percentage of trees are single-leaf pinyon.	Certain productive sites may not be converted to livestock forage so as to produce pinyon nuts. Trees or groups of trees lying outside designated "leave" areas will be chained, thus losing some pinyon nut production.
	3b Allow no land treatments or related work that will impair primitive qualities of areas possessing Class A values.	Some proposed land treatment sites lie within areas identified as having Class A values.	Reject the recreation recommendation of allowing no land treatments in Class A value areas.	All range improvements including land treatments must meet requirements of Visual Resource Contrast Rating System for the particular area where they are to be developed. Those not meeting requirements must be modified or abandoned.

RELATIONSHIPS TO THE STATE OF ARIZONA

Arizona State Land Department

The Arizona State Land Department leases 77,689 acres of State land in the EIS area to livestock operators to run cattle in conjunction with BLM grazing permits. These lands are managed with public lands because the two are highly interspersed. State land and public lands receive essentially the same grazing use.

Arizona Game and Fish Department (AG&FD)

Cooperative relations between BLM and the Arizona Game and Fish Department (AG&FD) are outlined in the master agreement dated January 6, 1976. On May 24, 1976, BLM and AG&FD signed a habitat management plan for the Black Rock habitat area, and on February 2, 1977, they signed another habitat management plan on the Mt. Trumbull habitat area. These plans cover some 421,207 acres of public land within the EIS area. In addition, BLM and AG&FD cooperatively set big-game populations and AUM allocations for the EIS area.

RELATIONSHIPS TO LOCAL PROGRAMS

Mohave County has identified no proposals that would affect or be affected by the proposed action.

CHAPTER 2

AFFECTED ENVIRONMENT

CHAPTER 2

AFFECTED ENVIRONMENT

INTRODUCTION

This section describes the environmental components likely to be impacted by the proposed action or the alternatives. These descriptions are designed to be commensurate with the expected magnitude, intensity, duration, and incidence of impacts and to provide the reader with sufficient understanding of the environment to evaluate possible impacts.

CLIMATE AND AIR QUALITY

Three major air masses influence the climate of the Shivwits EIS area: the tropical Atlantic (Gulf), the tropical Pacific, and the polar Pacific. These masses create a biseasonal climatic pattern typical of most of the Southwest. Figure 2-1 illustrates the biseasonal effect on temperature and precipitation. Two peak storm periods occur—winter (December to March) and summer (July to September). During these periods the area receives a majority of its rainfall. Correspondingly, the driest months are April to June (spring drought) and September to November (fall drought). Prevailing winds in the summer are southwesterly (convectional) and in the winter are westerly (frontal).

Elevation and topography also influence the area's climate. The Grand Wash area (1,600 to 3,500 feet), for example, has lower rainfall and higher mean annual temperatures than the Shivwits Plateau (4,400 to 7,000 feet). Additionally, annual rainfall varies over the area. Figure 2-2 illustrates the yearly variation in precipitation at the Tuweep weather station.

Table 2-1 displays precipitation and temperature data from weather stations within or near the EIS area. Table 2-2 breaks down data into seven physiographic and biological zones. These temperature and precipitation data were extrapolated from weather station and rain gauges data. (See map 2-1 for rain gauge locations.)

Annual precipitation in the EIS area varies from 6 inches in the low desert (Littlefield) to 18 inches in woodlands (Black Rock Mountain). The area's estimated average annual precipitation is 10.2 inches. Summer precipitation usually comes as short but intense thunderstorms, commonly less than 3 miles in diameter and often accompanied by strong winds and local flash flooding. Winter storms bring slightly less moisture than do summer storms, but their lower intensity allows more moisture to soak into the soil.

TOPOGRAPHY

The EIS area overlies a portion of two physiographic provinces. The eastern two-thirds of the area, between the Hurricane Cliffs and the Upper Grand Wash Cliffs, lies on the Colorado Plateau. The area west of the Grand Wash Cliffs to the Nevada border lies along the eastern edge of the Basin and Range province. The Colorado Plateau portion of the EIS area expresses typical plateau type topography with relatively flat mesas and benchlands intersected by moderately deep near-vertical walled canyons. The Basin and Range portion is also somewhat typical with a broad desert basin bounded on the west by a relatively low mountain range.

VEGETATION

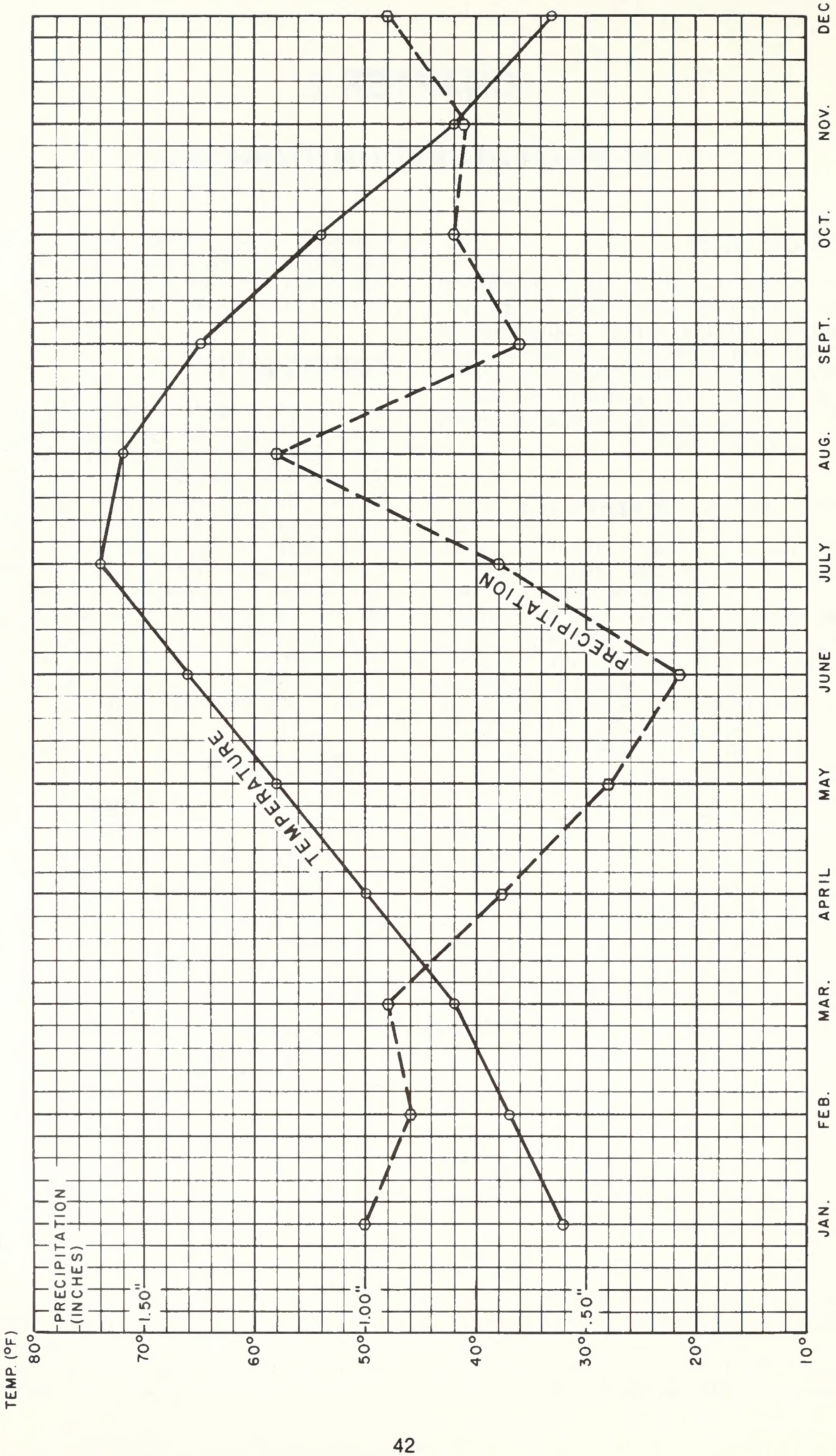
VEGETATION SUBTYPES

The Shivwits EIS area supports a variety of plant species, resulting from the area's diversity of soil types, elevations, exposures, temperatures, precipitation, and existing and past uses. The vegetation of an area that has one to several dominant or codominant species is identified as a vegetation subtype, usually named after the dominant or most abundant species. These vegetation subtypes vary in the number of species and percent of each species in the total composition. A sagebrush vegetation subtype, for example, may consist of 100 percent sagebrush or as little as 10 percent sagebrush, as long as sagebrush is the dominant species.

The EIS area has 12 vegetation subtypes: grassland, sagebrush, saltbush, pinyon-juniper, desert shrub, half-shrub, mountain shrub, creosotebush, conifer, shadscale, and annuals. (See table 2-3, plate 2, and appendixes 3-1, 3-2, 3-3, 3-4, and 3-5.

BLM obtained vegetation information from forage surveys as described in chapter 1 and appendix 1-1. These data exist in the inventory folders at the Arizona Strip District office. The

FIGURE 2-1



TEMPERATURE AND PRECIPITATION

FIGURE 2-2

TUWEEP ANNUAL PRECIPITATION SINCE 1951

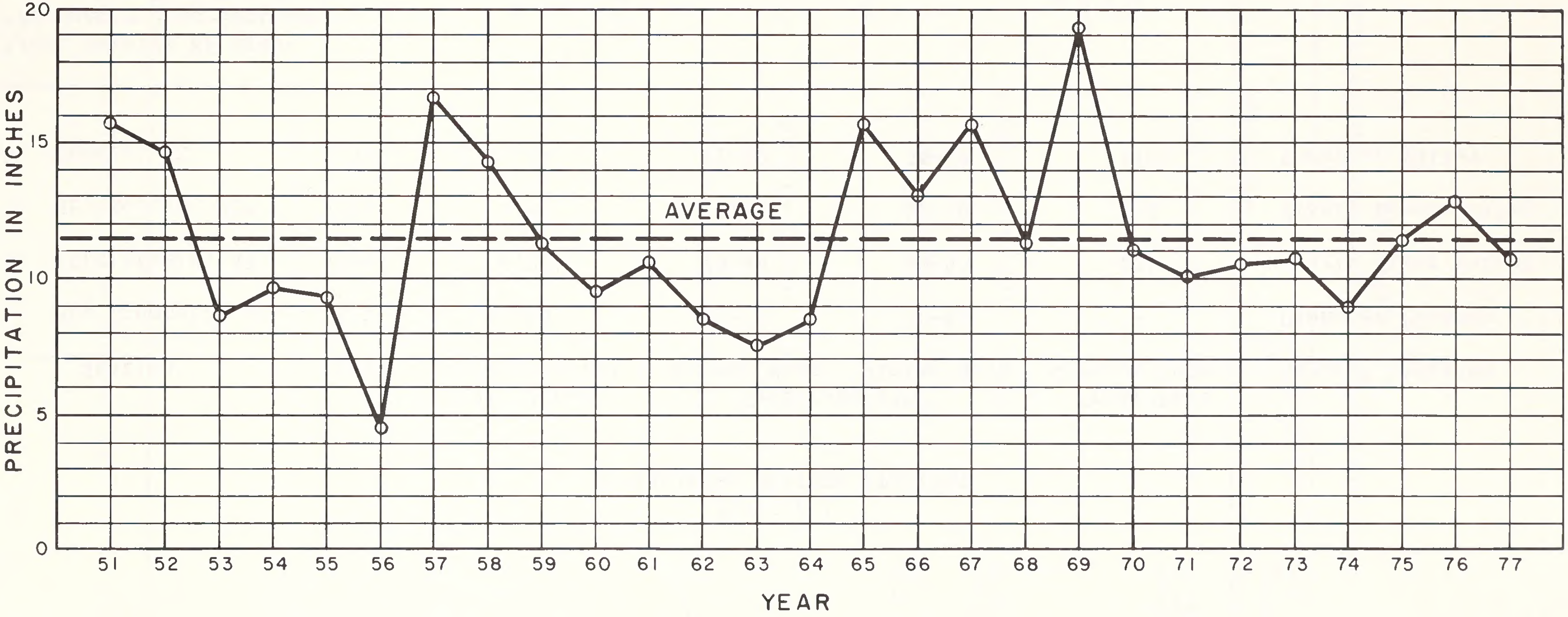


TABLE 2-1
ESTABLISHED WEATHER STATIONS

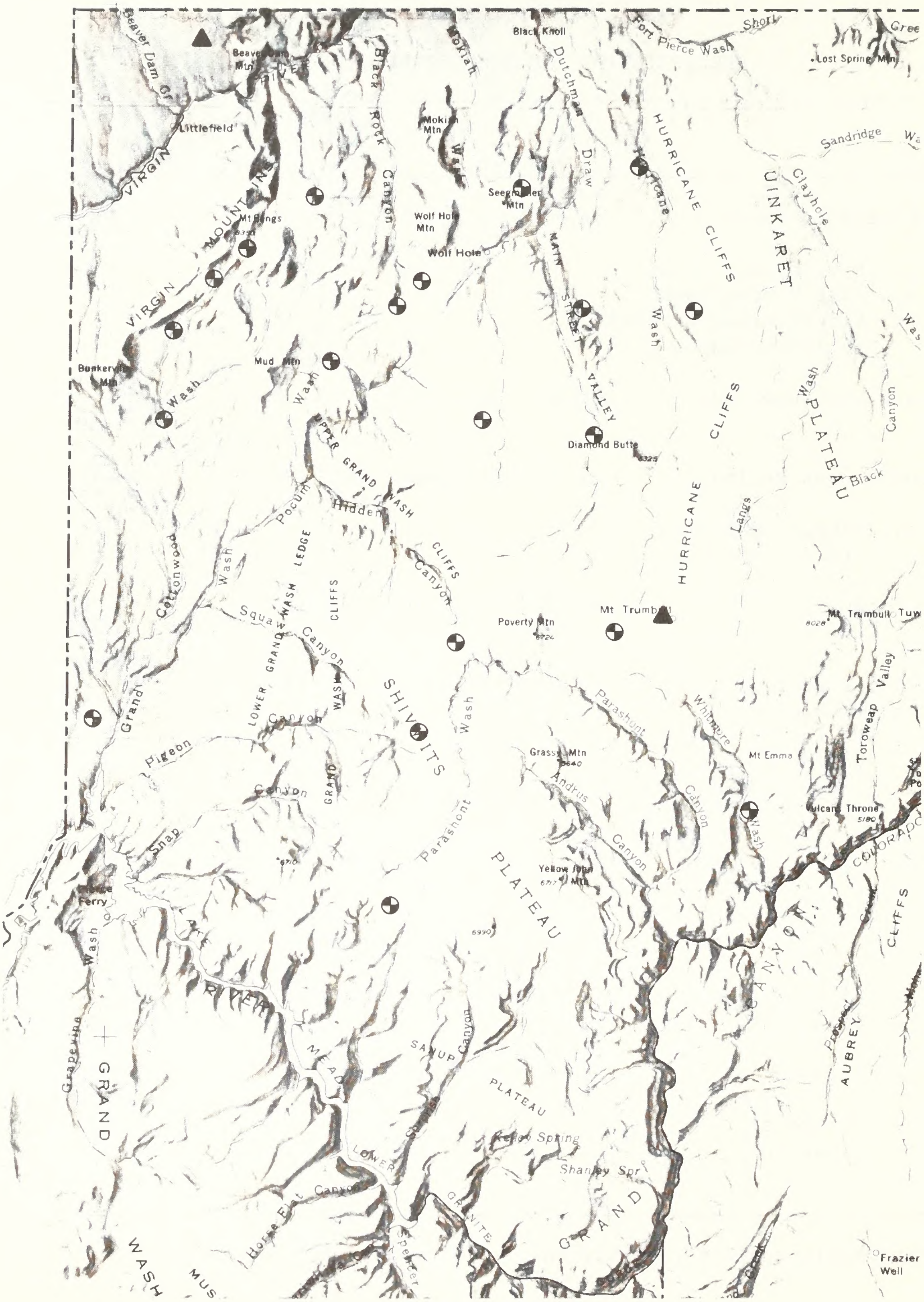
Station	Elev.	Ave. Annual Precipitation	Temperature** Summer Mean	Winter Mean	Frost-Free Growing Season	General Location
1. Mt. Trumbull, AZ	5600	11.63	67-76	30-45	-	Uinkaret Plateau
2. Littlefield, AZ	1860	6.22	79-88	43-55	224	Virgin River Valley
3. St. George, UT*	2760	7.60	77.84	40-50	218	Virgin River Valley
4. Tuweep, AZ	4775	11.24	71-80	35-49	170	Toroweap Valley

*Just outside ES area.
**Summer = June-September
Winter = December-March.

TABLE 2-2
PRECIPITATION AND TEMPERATURE BY GEOGRAPHIC ZONES

Area*	Elevation	Approximate Annual Precipitation	Approximate Summer/Winter Mean Temperatures
Northern Lowlands	1,600' to 3,500'	Less than 8"	77-85°F 42-50°
a. Littlefield Area			
b. Fort Pierce Wash			
c. Virgin River Narrows Sullivan Canyon			
Grand Wash Lowlands	1,600' to 3,300'	7"-11"	80-85°F 43-50°
Mountainous Regions	5,000' to 8,000'	10"-18"	63-75° 29-42°
a. Virgin Mountains (Black Rock)			
Hurricane Wash	4,200' to 5,400'	9"-12"	73-78° 39-44°
Shivwits Plateau and Highlands	4,400' to 7,000'	9"-15"	66-77° 33-44°
a. Wolfhole Valley			
b. Wolfhole Mountain			
c. Poverty Mountain			
d. Seegmiller Mountain			
e. Mt. Dellenbaugh			
f. Grassie Mountain			
Bench Regions	4,000' to 4,500'	8"-11"	77-79° 43-45°
a. Sanup Plateau			
b. Grand Wash Bench			
Inner Canyons	3,800' to 5,000'	8.5"-12"	75-80° 41-46°
a. Whitmore			
b. Parashaunt			
c. Andrus			

*Geographic zones as classified by Lipe and Thompson (1977).



MAP 2—I

RELIEF MAP OF SHIVWITS ES AREA AND ENVIRONS (EXCLUDING PORTIONS OF UTAH)

⊕ BLM RAIN GAUGE ▲ NATIONAL WEATHER SERVICE RAIN GAUGE

SOURCE: U.S. GEOLOGICAL SURVEY SHADED RELIEF MAP OF ARIZONA, 1959

TABLE 2-3

CHARACTERISTICS OF VEGETATION SUBTYPES

Subtype	Acres	% ES Area	Associated Species Common Name*	Key Species Composition (Average Percent)		Usable Forage++ Production	Range Condition (Acres)			Elevation (Feet)	Annual Precipitation (Inches)
				Grass**	Shrub***		Good	Fair	Poor		
Grassland	254,129	14	Blue grama, galleta grass, squirreltail, Indian ricegrass, crested wheatgrass, Russian wildrye	47	11	96	212,455	12,884	28,790	4,000-5,000	5-12
Sagebrush	163,914	9	Big sagebrush, sandsage, fringed sage, black sagebrush, Bigelow sage, squirreltail, Junegrass, western wheatgrass, blue grama, galleta grass, ephedra, cliffrose, fourwing saltbush	21	5	63	5,386	109,819	48,709	3,000-8,000	8-16
Pinyon-Juniper	434,439	20	Pinyon, juniper, sagebrush, cliffrose, blue grama, galleta grass, Indian ricegrass, squirreltail, ring muhly	9	8	43	1,736	166,951	265,752	4,500-8,000	10-20
Saltbush	165	1	Fourwing saltbush, blue grama, galleta grass, sacaton, shadscale	25	38	102	165	-	-	3,000-6,000	5-12
Half-Shrub	45,555	2	Snakeweed, blue grama, galleta grass, shadscale	9	15	38	-	15,453	30,102	3,000-6,000	5-12
Desert Shrub	515,872	29	Blackbrush, shadscale, ephedra, buckwheats, wolfberry, yucca	9	12	39	27,086	168,883	319,903	2,500-5,000	5-12
Mountain Shrub	34,542	1	Oak, serviceberry, mountain mahogany, bluegrasses	2	32	92	4,006	12,335	18,201	5,000-8,000	15-25
Blackbrush	43,089	2	Blackbrush, snakeweed range ratany, galleta, Indian ricegrass, ephedra	2	13	43	-	703	42,386		
Creosotebush	99,281	5	Creosotebush, bursage, range ratany, big galleta	4	14	29	9,629	30,815	58,837	2,500-4,000	5-10
Shadscale	1,535	1	Shadscale, galleta grass, blue grama, fourwing saltbush	Trace	9	34	-	-	1,535	3,000-4,500	5-10
Conifers	5,938	1	Ponderosa pine, cliffrose, blue grama, Arizona fescue, bitterbrush, sagebrush	6	13	72	-	-	5,938	6,000-8,000	15-25
Annuals	41,682	2	Cheatgrass, Russian thistle	7	6	29	3,339	20,902	17,441	4,000-6,000	5-12
Unsuitable	208,754	13	Varies	-	-	-	-	-	208,754	-	-
TOTAL							263,802	538,745	1,046,348		

* Refer to appendix 2-1 for scientific names.

** Key Grass Species: Indian ricegrass, squirreltail, galleta, blue grama, black grama, western wheatgrass, sand dropseed, crested wheatgrass, Russian wildrye, needlegrass, tall wheatgrass

*** Key Shrub Species: Fourwing saltbush, winterfat, clifforse, ephedra, serviceberry

+ Air dry pounds/acre

++ Air dry pounds/acre at no more than 50 percent utilization. Usable forage is vegetation palatable and available to livestock and wildlife.

Source: Forage Production Inventory Method earliest portion of the current survey was conducted in 1972, and the most recent data were gathered in 1977. The majority of the data were gathered between 1975 and 1977.

Each allotment varies in elevation, precipitation, and seasonal growth of key species. Plant phenologies for the EIS area are shown on table 2-4. Appendixes 3-1, 3-2, and 3-3 present range condition and trend, vegetation production, and key species composition by allotment and vegetation subtype.

Key Species Composition, Range Condition, and Usable Forage Production

Table 2-3 displays key species composition, range condition, and usable forage production for each vegetation subtype. Key grass species composition in the grassland subtype, for example, ranges from 5 to 77 percent and averages 47 percent. Key shrub species composition in the grassland subtype ranges from 0 to 38 percent across the EIS area and averages 11 percent. Annual usable forage production averages 96 air dry pounds per acre on grassland. Grassland production across the EIS area ranges from 30 to 156 air dry pounds per acre.

Range condition of the grassland subtype shows 212,455 acres in good condition, 12,884 acres in fair condition, and 28,740 acres in poor condition.

Implemented AMPs

Sixteen allotments in the EIS area are managed under implemented AMPs. The response of key species composition, usable forage production, and range condition to grazing systems on these allotments is discussed in detail in chapter 3, Vegetation, and in appendixes 3-1, 3-2, 3-3, 3-4, and 3-5. Projections in chapter 3 are based on the results of implemented grazing systems.

Apparent Trend

Appendix 3-1 shows apparent trend as static on all allotments except the 16 under implemented AMPs. Trend for these allotments is shown in chapter 3, Vegetation. Apparent trend, however, is a risky estimation, which carries little value. It can only be measured, as in AMP studies, at different points over several years.

BARREN AND UNSUITABLE LAND

Fifteen percent of the EIS area (208,754 acres), supporting a variety of vegetation types, is steep and rocky, lacks adequate water, is inaccessible, or is too low in forage productivity to be suitable for livestock grazing. BLM has allocated no livestock forage on these areas. Although wildlife use these areas, livestock use them only slightly.

THREATENED AND ENDANGERED PLANT SPECIES

The Endangered Species Act of 1973 establishes two categories of species subject to Federal protection: endangered and threatened. Following the passage of this act, the Secretary of the Smithsonian Institution issued a report to Congress, listing proposed endangered and threatened plant species of the United States. This list was published in the Federal Register on July 1, 1975, revised, and again published in the Federal Register on June 16, 1976. The taxa for Arizona shown in these two Federal Register lists are the basis for selection of proposed endangered and threatened plants in the Shivwits EIS area.

Thirty-seven species from the Smithsonian lists occur or possibly occur in the Shivwits EIS area (table 2-5). Twenty of these plants have been located in the EIS area through field searches in 1976, 1977, and 1978.

Extensive field studies indicate that the proposed threatened and endangered plants found in or near the EIS area are highly soil specific or site specific and therefore restricted in distribution. Moreover, those listed plants are relatively unpalatable to livestock. Intensive studies covering at least one complete weather cycle, however, will be necessary to validate endangered or threatened status.

RIPARIAN VEGETATION

No quantitative data on riparian vegetation exist in the BLM inventories, since inventories of some springs and the Virgin River have just begun. Qualitative data, however, exist from observations made on visits to the areas.

The predominate native riparian overstory vegetation includes cottonwood, willow, and ash. Saltcedar and Russian olive are exotics that

TABLE 2-4

PHENOLOGICAL DEVELOPMENT OF KEY SPECIES

	Developmental Stages			
Key Species	Start Growth	Flowering	Seed Ripe	Seed Dissemination
Grasses				
Blue grama and black grama	6/1	8/1	9/15	10/10
Indian ricegrass	2/15-3/1	5/1-6/1	7/15	8/15
Galleta	3/15-5/1	5/1-6/1	8/15	10/15
Squirreltail	2/15-3/1	6/1	7/1	8/1
Wheatgrasses	3/1	5/15	7/1	8/15
Sacaton	4/1	6/20	7/15	8/30
Russian wildrye	3/1	5/15	7/1	8/15
Needlegrass	3/1	5/15	7/1	8/1
Shrubs				
Range ratany	3/1	5/1-5/15	8/1-9/15	10/1
Cliffrose	4/1	5/15	7/1	8/1*
Fourwing saltbush	3/15	6/15	11/1	12/1
Winterfat	3/1-4/15	3/20-6/1	8/1-9/15	10/1-12/1
Mormon tea	3/1-5/1	6/1-7/20	8/1-9/15	10/1-12/1
Bursage	2/15-3/1	5/1-5/15	8/1-9/15	10/1

*Following year

TABLE 2-5
PLANT SPECIES PROPOSED FOR THREATENED AND ENDANGERED STATUS

Scientific Name	Proposed Status T = Threatened E = Endangered	Found Through Recent Field Search in or Near ES Area	Possibly Occurring in ES Area
Agave utahensis var. kaibabensis	T	X	
Aquilegia desertorum	T		X
Arabis gracilipes	T		X
Astragalus ampullarius	T		X
Astragalus lancearius	T	X	
Camissonia confertiflora	T		X
Camissonia exilis	T		X
Camissonia parryi	T	X	
Camissonia specuicola ssp. hesperia	T		X
Camissonia specuicola ssp. specuicola	E		X
Clematis hirsutissima var. arizonica	T		X
Cryptantha semiglabra	T	X	
Cymopterus newberryi	T	X	
Erigeron lobatus	T		X
Eriogonum darrovii	E	X	
Eriogonum heermanni var. subracemosum	T		X
Eriogonum thompsonae var. albiflorum	T	X	
Eriogonum thompsonae var. atwoodii	E	X	
Eriogonum thompsonae var. thompsonae	T	X	
Eriogonum zionis var. coccineum	E	X	
Fraxinus anomala var. lowellii	T		X
Fraxinus cuspidata var. macropetala	T	X	
Haplopappus salicinus	E		X
Haplopappus scopulorum	T	X	
Nama retrorsum	T		X
Opuntia whipple var. multigeniculata	T	X	
Pediocactus peeblesianus var. fickeiseniae	T	X	
Pediocactus sileri	E	X	
Peteria thompsonae	T	X	
Phacelia cephalotes	T	X	
Phacelia constancei	T	X	
Phacelia filiformis	E		X
Phacelia rafaelensis	T	X	
Psoralea epipsila	E		X
Rosa stellata	T	X	
Silene rectiramea	E		X
Sisymbrium kearneyi	E		X

have invaded these habitats in recent years. Mesquite, desert willow, and arrowweed are the dominant shrub species. The herbaceous layer contains bullrushes, cattails, rushes, and sedges. Pondweed, watercress, *chara* spp. and filamentous algae are found in areas with permanent water.

SOILS

The soils of the Shivwits EIS area are formed mainly in residuum from limestone, sandstone, and shale. Soils of Black Rock, Wolfhole, Seegmiller and Poverty Mountains and the Shivwits Plateau, however, are formed in basalt.

SOIL ASSOCIATIONS

Ten soil associations occur in the EIS area (plate 2). Table 2-6 lists the acreage and percent of each association, soil productivity, limiting factors, some physical and chemical properties of individual soils in each association, and typical vegetation in each association. Table 2-7 shows the acreage of each soil association by allotment.

The general soil map does not indicate the exact soil at any particular place but rather shows a pattern of occurrence on defined landscapes. The information is useful for general planning but is not suitable for use in detailed planning, specific interpretations, or determining precise production potentials. A detailed soil survey does not exist for the Shivwits EIS area.

Several soil conditions in the EIS area restrict forage production. Soil association 1 has very steep slopes, shallow soils, and rock outcrops. Soil associations 2, 5, 6, 7 and 10 have large areas of shallow soils, which limit production, particularly during favorable precipitation on the Moenkopie, Shalet, Winona, Boysag, Tortugas, Welring, Rudd, Cabezon, and Cave series. Soils in associations 3, 5, 6, 7, 8 and 9 have low water holding capacities, association 3 because of sandy textures and the others because of rock fragments in the soil profile.

SEDIMENT YIELD

BLM specialists determined specific rates of sediment yield by allotment (table 2-8) using transects. They evaluated current erosion, considering the following factors that influence the rate and likelihood of erosion: surface geology, soils, climate, topography, ground cover, land use, upland erosion, channel erosion, and sediment transport. Table 2-8 shows a high variability in sediment yield for the allotments, ranging from 0.20 to 0.68 acre-feet per square mile per year. The weighted average annual sediment yield for all allotments is 0.30 acre-feet per square mile. (See appendix 2-2 for methodology.)

The mean annual discharge-weighted suspended-sediment concentrations for streams of the EIS area range from 15,000 to 28,000 parts per million. The Virgin River is the EIS area's only stream having specific sediment yield data. Measurements recorded at Littlefield, Arizona revealed an average sediment yield of 2,370,000 tons per year (Arizona Bureau of Mines, 1969). The Virgin River originates in Utah, but the 770,800 acres it drains in the EIS area contribute approximately 550,000 tons of sediment annually. Similar yields could be expected from other areas.

WATER RESOURCES

GROUND WATER

Ground water in the EIS area varies highly. The most notable aquifers lie in the northwest corner of the EIS area, south of the Virgin Mountains. According to Brown (1976), these areas have sand and gravel deposits 1,200 feet thick in which the water table lies as much as 500 feet below the surface. The rest of the area has largely bedrock formations on or near the surface, where the ground water commonly lies more than 500 feet below the surface, varying by geology and topography.

Some of the more prominent ephemeral streams overlying the bedrock portions of the area commonly contain *several* feet of unconsolidated alluvium. Shallow wells (25-150 feet) have been drilled into this material at several locations and adequate water obtained for livestock and wildlife use.

Along the eastern side of the EIS area, especially Hurricane Valley, the ground water is too deep to be economically drilled. In these areas constructing reservoirs or catchments to supply additional water would cost less than drilling and would insure a more dependable water supply.

The quality of ground water from wells ranges from very good to fair and is adequate for livestock and wildlife.

SURFACE WATER

The Colorado River and its tributaries drain the watershed of the EIS area. Streams in the

TABLE 2-6
PHYSICAL AND CHEMICAL PROPERTIES OF SOIL ASSOCIATIONS

No.	Soil Association Name	Percent of ES Area	Acres in ES Area	Slope %	Dominant Soil Textures	Depth in.	Permeability in./hr.	AWC+ in./ft.	Annual Precipitation in.	Annual Frost-Free Days	Drainage	Reaction pH	Hydrologic Group	Erosion Hazard	Total Potential Production Pounds/Acre Favorable Year	Total Potential Production Pounds/Acre Unfavorable Year	Soil Qualities Limiting Production	Common Plant Species
1	Torriorthents-Camborthids Rock Outcrop Association	13.0	239,814															galleta, sand dropseed, blackbrush, big sagebrush, Mormon tea, pinyon pine, Utah juniper
	Torriorthents - 65%			10-80	Variable	4-20	0.6-2.0	Variable	8-16	120-200	Somewhat excessive	7.4-8.4	D	Variable	SCS data not available.		Very steep slopes, shallow depths, low water-holding capacities	
	Camborthids - 15%			5-40	Variable	8-36	0.6-2.0	Variable	8-16	120-200	Well	7.4-8.4	D	Variable	SCS data not available.		Very steep slopes, shallow depths, low water-holding capacities	
	Rock outcrop - 15% *														No significant production.		Bedrock outcrops	
	Inclusions - 5% *																	
2	Moenkopie-Shalet-Tours Association	9.5	175,628															alkali sacaton, galleta, fourwing saltbush, blue grama, black grama, sand dropseed, Mormon tea, big sagebrush, scattered juniper
	Moenkopie - 60%			2-15	loamy sand, sandy loam	5-20	2.0-6.0	1.0-1.5	10-13	120-180	Well	7.9-8.4	D	Slight	650	300	Shallow depths, low water-holding capacities	
	Shalet - 15%			2-8	clay loam	4-15	0.06-0.2	1.5-2.0	10-13	150-180	Well	8.5-9.0	D	Moderate	500	200	Shallow depths, low water-holding capacities	
	Tours - 15%			0-3	silty clay loam, loam, silt loam	60	0.2-0.6	1.5-2.0	10-12	160-170	Well	7.9-8.4	B	Moderate	2,000	1,000	No limitations	
	Inclusions - 10% *																	
3	Fruitland-Sheppard-Rock Outcrop Assoc.	0.8	15,104															sand sagebrush, Indian ricegrass, sand dropseed, galleta, threeawn, blue grama, Mormon tea, scattered Utah juniper and pinyon pine
	Fruitland - 35%			2-15	sandy loam, loamy sand	60	2.0-6.0	1.0-1.5	12-16	120-160	Well	7.9-8.4	A	Slight	800	300	Sandy textures, low water-holding capacities	
	Sheppard - 35%			2-15	Loamy fine sand, fine sand	60	6.0-20.0	0.5-1.0	12-16	120-160	Somewhat excessive	7.9-8.4	A	Slight	700	350	Sandy textures, low water-holding capacities	
	Rock Outcrop - 15% *														No significant production.		Bedrock outcrops	
	Inclusions - 15% *																	
4	Tobler-Harrisburg-Junction Association	0.9	15,624															galleta, indian ricegrass, creosotebush, Mormon tea, winterfat, yellowbrush
	Tobler - 35%			1-10	fine sandy loam,	60	2.0-6.0	1.2-1.4	8-11	180-190	Well	7.9-8.4	B	Moderate	900	450	No limitations	
	Harrisburg - 30%			1-10	fine sandy loam, loamy fine sand	24-40	2.0-6.0	1.2-1.6	8-11	180-190	Well	7.9-8.4	C	Slight	750	125	Moderate soil depths	
	Junction - 20%			1-5	fine sandy loam	60	2.0-6.0	1.2-1.6	8-11	180-190	Well	7.4-7.8	B	Moderate	900	450	No limitations	
	Inclusions - 15% *																	
5	Winona-Boysag-Rock Outcrop Association	37.8	700,130															blue grama, black grama, needle and thread grass, galleta, sand dropseed, spike dropseed, winterfat, Bigelow sagebrush, rabbitbush, cliffrose, Utah juniper and pinyon pine
	Winona - 60%			2-15	gravelly loam and cobbly loam	6-20	0.6-2.0	1.0-1.5	11-16	130-170	Well	7.9-8.4	D	Moderate	700	400	Shallow depths, low water-holding capacities	
	Boysag - 15%			0-8	gravelly loam, loam, and sandy loam	10-20	0.06-2.0	1.5-2.0	11-16	130-170	Well	6.1-8.4	D	Slight to moderate	500	400	Shallow depths, low water-holding capacities	
	Rock Outcrop - 15% *														No significant production.		Bedrock outcrops	
	Inclusions -10% *																	
6	Tortugas-Welring-Rock Outcrop Association	2.2	40,316															Indian ricegrass, needle and thread, tall native bluegrass, big sagebrush, Utah juniper
	Tortugas - 20%			20-70	very gravelly loam, gravelly loam	10-20	2.0-6.0	0.8-1.2	12-14	120-160	Somewhat excessive	7.4-8.4	D	High	1,250	900	Shallow depths, steep slopes, low water-holding capacities	
	Welring - 25%			30-70	very gravelly loam, very gravelly silt loam	10-20	0.6-2.0	0,8-1.2	12-14	120-160	Well	7.4-8.4	D	High	1,250	500	Shallow depths, steep slopes, low water-holding capacities	
	Rock outcrop - 20% *														No significant production.		Bedrock outcrops	
	Inclusions - 15% *																	
7	Rudd-Wukoli-Cabezon Association	5.4	100,655															blue grama, sideoats grama, galleta, ring muhly, western wheatgrass, squirreltail, sand dropseed, Utah juniper, pinyon pine
	Rudd - 40%			2-15	gravelly loam	6-20	0.6-2.0	1.0-1.5	12-16	130-160	Well	7.9-8.4	D	Slight	700	400	Shallow depths, gravelly soils	
	Wukoki - 25%			1-15	gravelly loam and very gravelly loam	60	0.6-2.0	0.75-1.5	16-20	110-150	Somewhat excessive	7.4-8.4	B	Slight	800	400	Gravelly soils	
	Cabezon - 20%			8-30	cobbly loam, stony loam, cobbly clay	8-20	0.06-0.2	1.0-1.5	12-19	100-160	Well	6.6-7.3	D	Moderate	700	300	Shallow depths, cobbly and stony soils	
	Inclusions - 15% *																	
8	Collbran-Cabezon-Wukoki Association	6.0	111,255															Blue grama, sideoats grama, galleta, western wheatgrass, sand dropseed, Utah juniper, pinyon pine, ponderosa pine
	Collbran - 35%			1-10	very cobbly clay loam	60	0.06-0.2	1.5-2.0	15-22	110-150	Well	7.4-8.4	C	Slight	900	400	Cobbly soils	
	Cabezon - 30%			8-30	cobbly loam, stony loam, cobbly clay	8-20	0.06-2.0	1.0-1.5	15-19	100-160	Well	6.6-7.3	D	Moderate	700	300	Shallow depths, cobbly and stony soils	
	Wukoki - 15%			1-15	gravelly loam and very gravelly loam	60	0.6-2.0	0.75-1.5	16-20	110-150	Somewhat excessive	7.4-8.4	B	Slight	800	400	Gravelly soils	
	Inclusions - 20% *																	
9	Barkerville-Gaddles-Rock Outcrop Association	2.6	48,609															sideoats grama, western wheatgrass, Utah juniper, pinyon pine, manzanita, other shrubs
	Barkerville - 45%			15-60	very gravelly sandy loam, cobbly loam	20-40	2.0-6.0	0.6-1.0	12-20	100-135	Well	6.1-7.8	C	Slight	1,200	600	Moderate soil depths, steep slopes, gravelly soils, low water-holding capacities	
	Gaddes - 15%			15-60	gravelly sandy loam, cobbly loam	20-40	0.2-0.6	1.4-1.6	12-20	100-135	Well	6.1-7.3	C	Slight	1,500	600	Moderate soil depths, steep slopes, gravelly soils, low water-holding capacities	
	Rock Outcrop - 15% *												C	Slight	No significant production.		Bedrock outcrops	
	Inclusions - 25% *																	
10	Cave Association	21.8	404,090															Bush muhly, red brome, black grama, black brush, bursage, creosotebush, desert rue, Joshua tree, yucca
	Cave - 75%			2-30	gravelly sandy loam, gravelly loam	8-20	2.0-6.0	0.8-1.0	6-10	190-205	Well	7.9-8.4	D	Slight	750	400	Shallow soil depths, gravelly soils, low water-holding capacities	
	Rock Outcrop - 5% *														No significant production.		Bedrock outcrops	
	Inclusions - 20% *																	

Source: U.S. Department of Agriculture, Soil Conservation Service, 1974a, 1974b, and 1975, modified by subsequent field mapping.

+ Available Waterholding Capacity
* Properties too variable to be estimated

TABLE 2-8
SEDIMENT YIELD-PRESENT EROSION

Allotment Name	No.	Square miles	Acre-feet per square mile per year	Total Sediment Yield	Allotment Name	No.	Square miles	Acre-feet per square mile per year	Total Sediment Yield
Beaver Dam Slope	3	56.4	.26	14.7	Mud and Cane Spring	22	131.0	.26	34.1
Black Rock	15	56.7	.35	19.9	Mule Canyon	39	40.4	.25	10.1
Blake Pond	6	32.4	.35	11.3	Mustang Spring	16	15.5	.58	9.0
Clay Spring	12	18.8	.36	6.8	Pakoon	43	73.9	.29	21.4
Cottonwood	21	51.8	.30	15.5	Pakoon Spring	44	54.3	.33	17.9
Diamond Butte	31	8.5	.53	4.5	Parashaunt	50	316.7	.20	63.3
Duncan Tank	37	16.2	.28	4.5	Pa's Pocket	38	28.5	.27	7.7
Grassie Mountain	48	177.0	.27	47.8	Pat's Pond	33	2.0	.45	0.9
Hidden and Sullivan	25	54.8	.30	16.4	Penn's Well	49	36.2	.45	16.3
Ivanpah	40	23.4	.28	6.6	Poverty	41	116.6	.31	36.2
Iverson	34	3.8	.45	1.7	Purgatory Canyon	5	10.7	.60	6.4
Jackson Tank	10	12.2	.40	4.9	Quail Canyon	13	13.6	.35	4.8
Jump Canyon	26	42.8	.30	12.8	Rosenberry	32	6.2	.68	4.2
Last Chance	42	58.9	.28	16.5	Shelly	29	3.4	.44	1.5
Littlefield Community	18	119.7	.44	52.7	Snyder	36	5.5	.35	1.9
Littlefield Free Use	19	4.4	.31	1.4	Sullivan Canyon	17	39.0	.42	16.4
Little Tank	30	9.3	.35	3.3	Sullivan Tank	27	21.2	.26	5.5
Little Wolf	23	11.4	.36	4.1	Sunshine	8	27.4	.38	10.4
Lizard	7	20.6	.34	7.0	Tassi	46	192.8	.31	59.8
Lower Hurricane	9	79.4	.40	31.8	Toquer Tank	11	19.5	.38	7.4
Mainstreet	28	168.4	.34	57.3	Whiterock-Soapstone	24	29.1	.28	8.2
Mesquite Community	20	83.8	.28	24.2	Wildcat	47	239.9	.24	57.6
Mormon Well	2	24.0	.28	6.7	Wolfhole Canyon	1	115.8	.33	38.2
Mosby-Nay	45	38.5	.29	11.2	Wolfhole Lake	14	20.3	.45	9.1
Mt. Trumbull	35	51.4	.29	14.9	Wolfhole Mountain	4	76.8	.45	34.6

Figures derived from Denver Service Center adaptation of Pacific Southwest Interagency Committee (1968) method of calculating sediment yields. See appendix 2-2.

northern third of the EIS area drain into the Virgin River and thence into the Colorado River at Overton, Nevada. Streams in the southern two-thirds of the area either drain directly south into the Colorado River or west into Grand Wash and then into the Colorado River. Reaches of the Virgin River constitute the only perennial flow in the EIS area. A section of this river in the Virgin River Gorge commonly dries up during summer. All other drainages flow briefly during periods of intense thunderstorms in late summer, contributing insignificantly to the total flow of the Colorado River.

WATER QUANTITY

The EIS area's average annual precipitation is estimated to be 10.2 inches, of which 70 percent is consumed by evapotranspiration, 28 percent infiltrates the soil profile as ground water recharge, and 2 percent contributes to surface runoff (Harshbarger and others, 1966).

The Western U.S. Water Plan (Westwide Study Team, 1974) gives the consumptive water requirements for livestock, wildlife, and recreation for the Arizona Strip District. The needs prorated for the Shivwits EIS area are shown in table 2-9.

Estimates of surface water runoff range from 30,000 to 32,000 acre-feet per year. Sufficient water exists for livestock and wildlife if collection and storage facilities are provided in strategic locations. Springs and wells are also used in some areas.

WATER QUALITY

All of the surface and ground water is of good or very good quality for livestock and wildlife. Samples of these waters generally contain less than 600 milligrams per liter of total dissolved solids. A limited supply of water suitable for human consumption could be developed from the Navajo sandstone formation in the northwest of the area, and to a smaller degree from springs along Beaver Dam Wash and the Virgin River. None of these sources have been developed.

ANIMALS

The Shivwits EIS area is one of the most diverse biotic areas in Arizona, being influenced by plant and animal communities of the Great Basin as well as central Arizona. Moreover, the Grand Canyon has blocked the southward spread of animals, and some species inhabiting the EIS area do not occur south of the Grand Canyon. Approximately 300 species of vertebrates inhabit the EIS area either yearlong or at various times of the year.

Elevation in the EIS area ranges from 1,500 feet in the Pakoon area to 8,350 feet on Mt. Bangs in the Virgin Mountains. The vegetation varies from ponderosa pine forests to low desert.

Key wildlife species—federally listed, unique, or of high economic value—are discussed individually if they are significantly impacted by the proposed action or its alternatives. Species have been grouped together if agents are expected to impact members of the group similarly.

Habitat condition, population status, and trend data do not exist for most wildlife groups except big-game species. Virtually all habitats within the EIS area are grazed, making impossible the use of relict areas to compare grazed to ungrazed habitats.

MULE DEER

The EIS area has 763,663 acres of mule deer habitat, inhabited by approximately 2,400 to 2,800 mule deer (Dickens, 1979). Mule deer reach highest densities in the Black Rock, Wolfhole Mountain, Poverty Mountain, Parashaunt, and Mt. Trumball areas. (See map 2-2 for deer distribution.) Although deer inhabit most of the EIS area, they prefer the ponderosa pine, mountain brush, pinyon-juniper woodland, sagebrush, and blackbrush vegetation zones. They only lightly use creosotebush, desert shrub, and grassland communities. A list of key mule deer forage species appears in appendix 2-2.

The lack of succulent forbs and grasses on 194,841 acres of summer range (above 6,000 feet) before and after fawning limits productivity and expansion of resident mule deer herds. From 1961 to 1973 the annual fawn crop per 100 does averaged 45.5 percent, as compared to 83.6 percent for the Kaibab deer herd. Most summer range habitat is in poor condition (Black Rock, Poverty Mountain, and Wolfhole Mountain).

Some summer ranges have been chained and reseeded with forbs and grasses to provide better forage for deer. Chained areas have benefited mule deer except for excessively large areas lacking sufficient cover.

Intermediate ranges (5,000 to 6,000 feet in elevation) constitute 150,079 acres of habitat. The sagebrush and pinyon-juniper woodland

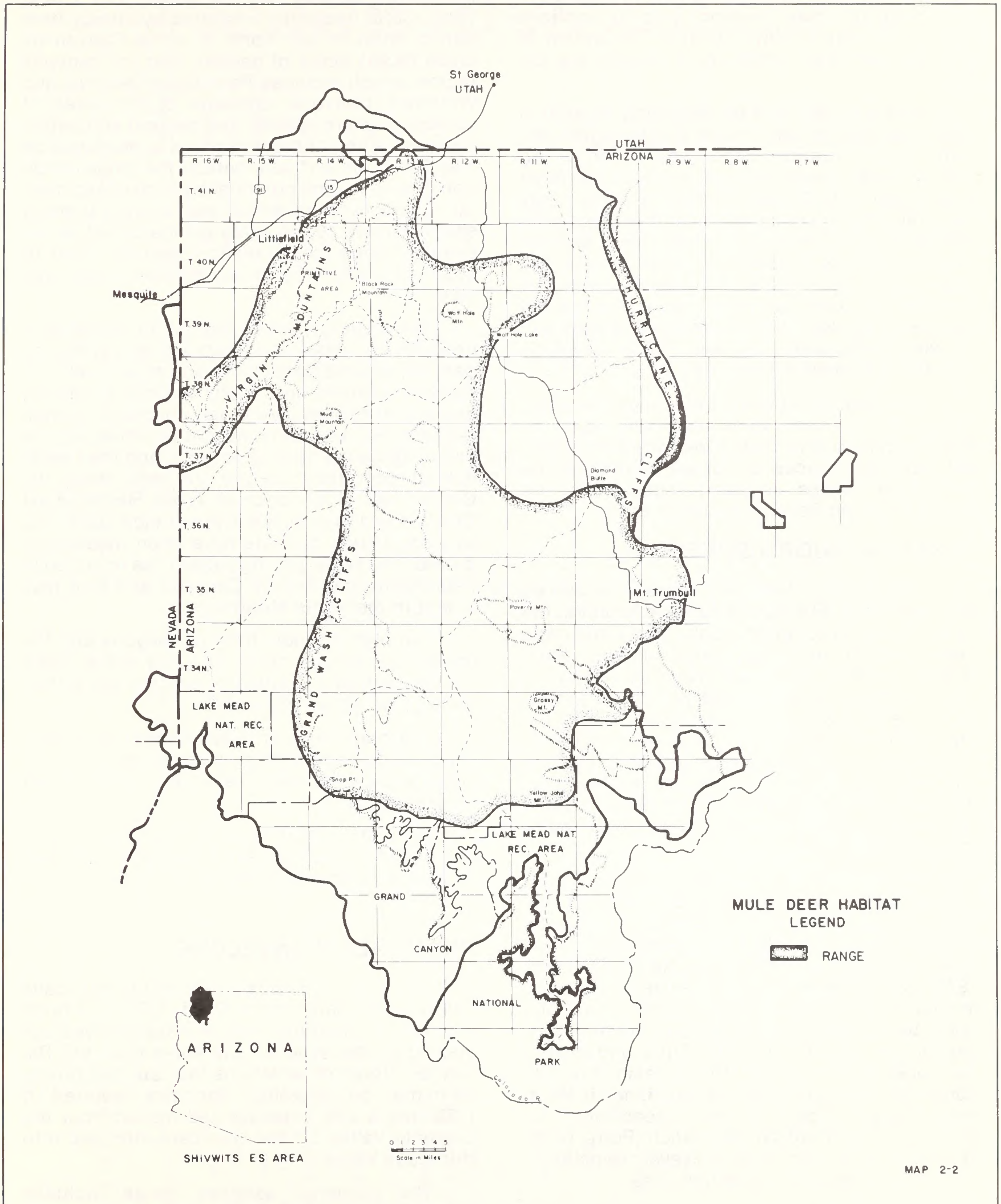
TABLE 2-9

ANNUAL CONSUMPTIVE WATER REQUIREMENTS FOR EIS AREA*

Type of Water Use	1973 Surface Flow	Surface Storage	Subsurface	Total	Projected 1980	2000	2020
Wildlife	1.6	7.7	1.6	10.9	11.1	11.7	12.4
Livestock	21.1	98.0	21.1	140.2	143.0	157.0	157.0
Recreation	0.2	1.0	0.3	1.5	3.7	7.3	9.4

*In acre-feet

Source: Westwide Study Team, 1974.


St George
UTAH
UTAH
ARIZONA
R 16 W
R 15 W
R 14 W
R 13 W
R 12 W
R 11 W
R 9 W
R 8 W
R 7 W
T. 41 N.
T. 40 N.
T. 39 N.
T. 38 N.
T. 37 N.
T. 36 N.
T. 35 N.
T. 34 N.
91
15
Littlefield
Mesquite
PAIUTE PRIMITIVE AREA
Black Rock Mountain
Wolf Hole Mtn
Wolf Hole Lake
VIRGIN MOUNTAINS
Mud Mountain
HURRICANE CLIFFS
Diamond Butte
GRAND WASH CLIFFS
Mt. Trumbull
Poverty Mtn
Grassy Mt.
NEVADA
ARIZONA
LAKE MEAD NAT. REC. AREA
Snap Pt.
Yellow John Mt.
LAKE MEAD NAT. REC. AREA
GRAND CANYON NATIONAL PARK
Colorado R.
ARIZONA
SHIVWITS ES AREA
0 1 2 3 4 5
Scale in Miles
MULE DEER HABITAT
LEGEND
RANGE

MAP 2-2

habitats occupy this range, varying in productivity according to past livestock grazing practices and the density of pinyon-juniper. The extent of use by deer and condition of ranges are unknown.

Mule deer winter in the following vegetation subtypes: blackbrush, desert shrub, sagebrush, and pinyon-juniper woodland. Occupying 417,743 acres, these subtypes range in elevation from 3,800 to 5,200 feet. During years of heavy snowfall, the forage condition of these ranges is critical to mule deer. Important forage species include cliffrose, blackbrush, shrub live oak, big sage, and various forbs and grasses. Little diet information exists for mule deer within the EIS area, and the condition and degree of deer use on winter ranges are unknown. The range condition for mule deer is presented in table 2-10.

The presence of water influences the distribution of mule deer. Many areas lack water, restricting their use by deer. Livestock waters benefit deer, but fences or corrals sometimes restrict deer access to water, especially in the Black Rock and Poverty Mountain areas.

DESERT BIGHORN SHEEP

Historically bighorn sheep occurred throughout the EIS area in suitable habitats: the Virgin Mountains, Grand Wash Cliffs (upper and lower ledges), and associated canyons. Parashaunt, Andrus, Mule, and Whitmore Canyons also contained viable sheep populations. Why bighorn sheep were eliminated from most of the areas is not entirely known. Competition with domestic sheep for forage and increased disease and parasites spread by domestic livestock may have been the major reasons. In addition, hunting and illegal shooting probably contributed to their decline.

The distribution of bighorn sheep in the EIS area is highly restricted. A herd of 25 to 30 animals occupies the Sanup Plateau, frequently crossing the Lake Mead National Recreation Area boundary. AG&FD personnel (Dickens, 1979) estimate about 12 animals use public lands in this area—south of Pigeon Canyon (six bighorns were sighted on the Savannic Mine Road), east of the Lower Grand Wash Cliffs, and west of the Upper Grand Wash Cliffs. Occasionally, bighorns use the area around Woods Ranch in Whitmore Canyon. Seven bighorn sheep were observed just south of Woods Ranch (Pratt, 1979). The majority of the herd, however, remains in Lake Mead National Recreation Area.

The potential and historical habitat of bighorn sheep encompasses 197,197 acres and three distinct geographic areas. The Virgin Mountains contain 103,731 acres. The Grand Wash Cliffs (presently inhabited by sheep) from Sanup Point to just north of Jump Canyon include 69,991 acres of habitat. And the canyons region, which includes Parashaunt, Andrus, and Whitmore Canyons, contains 23,475 acres of suitable bighorn habitat. The present and potential distribution of bighorn sheep is displayed on map 2-3. Table 2-11 summarizes the range condition of present and potential bighorn sheep habitat. Of the total potential and present bighorn sheep habitat, 46,856 acres are classified as unsuitable range for domestic livestock. Refer to appendix 2-3 for a list of key bighorn forage species.

The bighorn sheep habitat in Parashaunt (lower Sanup pasture) and Wildcat (lower Pigeon pasture) allotments is in fair and poor condition. Canyon bottoms are mostly in poor condition, and bench habitats are in fair condition. Terrain features, such as canyons and benches, significantly influence grazing patterns and the overall habitat condition. Canyon bottoms along the Grand Wash Cliffs, such as Jump, Hidden, Last Chance, and Pigeon, are in poor range condition, whereas bench habitats have been moderately grazed. The same grazing pattern has occurred in Parashaunt and Andrus Canyons and to a less extent in the Virgin Mountains.

The higher productivity of canyons and the immediate escape cover of cliffs make these habitats extremely critical to present and potential bighorn sheep populations.

The placement of livestock waters in canyons has compounded the poor range condition, creating sacrifice areas that extend up and down canyon bottoms.

Bighorns occur predominantly in blackbrush and creosotebush vegetation subtypes close to canyon-cliff habitats.

PRONGHORN ANTELOPE

Pronghorn antelope inhabited the Hurricane Valley in the early 1900s (Pratt, 1979), but hunting, illegal shooting, and excessive livestock grazing are believed to have killed them off. Recent scattered observations indicate that pronghorn may be returning. Ranchers reported in 1978 that a few antelope had moved from the Clayhole Valley off the Hurricane Rim and into Hurricane Valley.

The potential antelope range includes 212,251 acres of habitat in Hurricane and Mainstreet Valleys north of Diamond Butte. In the near future AG&FD and BLM will cooperate to re-

TABLE 2-10
MULE DEER DATA BY ALLOTMENT

Allotment	Acres of Habitat and Condition* Good	Fair	Poor	Range Trend	AUMs Allocated	Herd Size**	Season	Conflicts Degree	Resource
Black Rock		24,183	1,391	Static	661	220	YL	High	Forage
Clay Spring			3,251	Static	36	12	YL	Low	Forage
Cottonwood			6,618	Static	68	45	Winter	Moderate	Forage
Diamond Butte			165	Static	10	8	Winter	Low	Forage
Duncan Tank	742			Static	17	11	Winter	Low	Forage
Grassie Mountain		95,283		Static	1,692	564	YL	Low	Forage
Hidden and Sullivan			15,821	Static	495	165	YL	Low	Forage
Ivanpah		6,733		Static	129	44	YL	Low	Forage
Jump Canyon		3,104	18,016	Static	263	87	YL	Low	Forage
Last Chance and Link		14,843	20,904	Static	445	148	YL	Low	Forage
Littlefield Community	2,918	6,697	24,330	Static	904	300	YL	High	Forage
Little Wolf		1,991	5,280	Static	172	57	YL	Low	Forage
Mainstreet			8,960	Static	152	51	YL	Low	Forage
Mesquite Community			21,166	Static	252	84	YL	Low	Forage
Mt. Trumbull		3,328		Static	54	36	Winter	Low	Forage
Mud and Cane Spring		742	58,779	Static	840	280	YL	Moderate	Forage
Mule Canyon	3,376		3,297	Static	89	59	Winter	Low	Forage
Mustang Spring		5,197		Static	127	42	YL	Moderate	Forage
Parashaunt		26,085	52,533	Static	1,323	441	YL	Moderate	Forage
Pa's Pocket	3,972	6,248		Static	154	102	Winter	Low	Forage
Penns Well	991		10,834	Static	221	74	YL	Low	Forage
Poverty Mountain			25,702	Static	512	171	YL	Moderate	Forage
Quail Canyon		2,919		Static	63	21	YL	Low	Forage
Sullivan Canyon	1,318	1,081	14,549	Static	403	134	YL	High	Forage
Sullivan Tank			11,494	Static	160	53	YL	Low	Forage
Whiterock-Soapstone			10,369	Static	132	45	YL	Low	Forage
Wildcat	1,160	31,227	102,244	Static	2,862	954	YL	Moderate	Forage
Wolfhole Canyon	2,685	3,166	4,457	Static	250	83	YL	Low	Forage
Wolfhole Lake	8,785	1,586	1,174	Static	210	70	YL	Low	Forage
Wolfhole Mountain		974	8,472	Static	278	93	Spring	High	Forage
					12,974				

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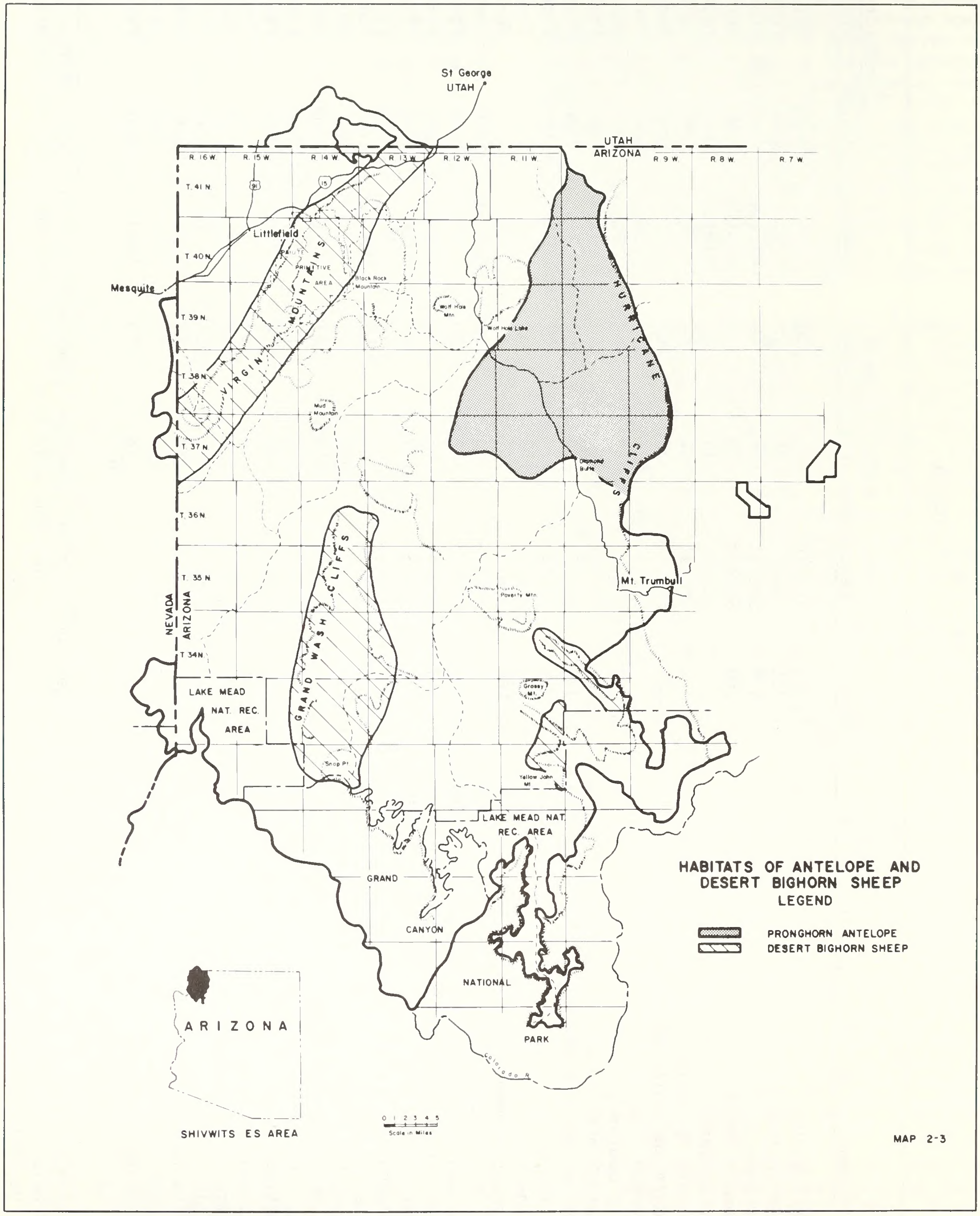
* Habitat condition is based on livestock forage conditions and does not necessarily reflect true habitat conditions.

** Herd size is average herd size based on season of use and AUMs allocated. Herd size may vary considerably on yearlong use areas because of season and elevation ranges.



HABITATS OF ANTELOPE AND DESERT BIGHORN SHEEP

TABLE 2-11
BIGHORN DATA BY ALLOTMENT

Allotment	Acres of Habitat and Condition* Good	Fair	Poor	Range Trend	AUMs Allocated	Potential Herd Size	Season of Use
Cottonwood			2,688	Static	10	4	Yearlong
Duncan Tank	1,289		4,625	Static	30**	12	Yearlong
Grassie Mountain			12,928	Static	71**	29	Yearlong
Ivanpah			358	Static	2	-	Yearlong
Jump Canyon		3,104	8,672	Static	40	17	Yearlong
Last Chance and Link			10,906	Static	35	15	Yearlong
Littlefield Community			48,250	Static	223**	93	Yearlong
Mesquite Community			25,088	Static	127**	51	Yearlong
Mud and Cane Spring			4,864	Static	20	8	Yearlong
Mule Canyon			3,763	Static	18**	7	Yearlong
Pakoon		9,677		Static	33	14	Yearlong
Parashaunt			14,720	Static	49**	20	Yearlong
Penns Well			1,254	Static	6	2	Yearlong
Purgatory			1,536	Static	5	2	Yearlong
Sullivan Canyon		2,120	9,861	Static	55	23	Yearlong
Wildcat			15,130	Static	53	22	Yearlong
Wolfhole Canyon		1,513	535	Static	9	4	Yearlong
Wolfhole Mountain		2,130	9,953	Static	51**	21	Yearlong
					837		

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* Habitat condition is based on livestock forage conditions and does not necessarily reflect true habitat conditions.

** A portion of these AUMs are allocated on areas inaccessible to livestock.

TABLE 2-12
PRONGHORN DATA BY ALLOTMENT

Allotment	Acres of Habitat and Condition* Good	Fair	Poor	Range Trend	AUMs Allocated	Potential Herd Size	Season of Use
Blake Pond		6,500	2,230	Static	42	17	Yearlong
Clay Spring	4,844		3,015	Static	35	14	Yearlong
Diamond Butte	2,304			Static	11	5	Yearlong
Hidden and Sullivan		876		Static	4	-	Yearlong
Jackson Tank	7,228		452	Static	35	14	Yearlong
Little Tank	3,456			Static	16	7	Yearlong
Lower Hurricane	33,459			Static	151	63	Yearlong
Mainstreet	41,026	27,420	13,755	Static	372	155	Yearlong
Poverty Mountain	15,181			Static	70	29	Yearlong
Shelley	2,190			Static	12	5	Yearlong
Sullivan Tank			1,331	Static	8	3	Yearlong
Sunshine	6,235		114	Static	29	12	Yearlong
Toquer Tank	11,904			Static	54	22	Yearlong
Whiterock-Soapstone	2,304			Static	9	4	Yearlong
Wolfhole Canyon	3,970	11,339		Static	41	17	Yearlong
Wolfhole Lake	1,485			Static	10	4	Yearlong
Wolfhole Mountain	3,010		5,402	Static	32	13	Yearlong
					931		

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*Habitat condition is based on livestock forage conditions. It does not necessarily reflect true habitat conditions because it omits the conditions of forbs, an important component of pronghorn diet.

establish antelope within their historic range. The habitat could easily support 400 animals or 1.2 animals per section (MFP Recommendation). Refer to map 2-3 for pronghorn distribution. Table 2-12 summarizes forage condition of pronghorn habitat by allotment.

AG&FD collected five stomach samples in 1977 and four fecal samples in 1978 from antelope taken during the September hunting season in the Clayhole Valley in the Arizona Strip District's Vermillion Resource Area. Forage species making up more than 5 percent of the diet included Bigelow sage, globemallow, prickly pear, plantago, shrubby buckwheat, and paper flower. Both globemallow and Bigelow sage are highly palatable to livestock. Additional key pronghorn and forage species are listed in appendix 2-2.

CARNIVORES

Carnivores play an important ecological role in wildlife communities, since predator-prey relationships must be in balance for the healthy functioning of communities. The coyote, the most abundant carnivore, occurs throughout the EIS area. Other common carnivores include the mountain lion, bobcat, gray fox, and kit fox.

The habitat condition and population status of carnivores in the EIS area are unknown. The abundance of local prey species usually reflects habitat condition and inherent population cycles. The condition of predator populations is indirectly related to the habitat condition of prey populations.

UPLAND GAME

Two resident species of upland game birds inhabit the EIS area: Gambel's quail and Merriam turkey. Gambel's quail distribution has recently increased due to land treatment of pinyon-juniper woodlands. Quail occur from the ponderosa pine zones to the low desert creosotebush. The highest densities occur below 3,800 in desert shrub, blackbrush, and creosotebush vegetation subtypes. The lack of adequate cover in drainage areas (wash and canyon habitats) prevents quail from feeding, and the lack of escape cover around waters prevents quail from obtaining drinking water.

The AG&FD attempted two turkey transplants, one in 1962 and one in 1978. The 1962 plant involved 25 Arizona wild trapped turkeys aerially released in the Mt. Dellenbaugh area. Scattered reports indicate that turkeys are still present but in low numbers.

In the winter of 1978, 10 wild turkeys trapped near Williams, Arizona were released on Black Rock Mountain near Larson Tank. The success of the plant cannot be determined until more time has passed. The absence of a good forb and grass component and poor water distribution may have prevented establishment of these turkeys.

Migrant upland game species in the EIS area include the bandtailed pigeon and the mourning dove. Primarily a summer resident, the bandtailed pigeon occupies the ponderosa pine zones in the Black Rock and Parashaunt areas. Mourning doves are scattered throughout the EIS area in virtually every habitat.

SMALL MAMMALS

The EIS area's small mammals range in size from the small desert shrew to the large desert woodrat. Small-mammal species diversity is highest in the desert shrub and creosotebush vegetation subtypes.

Eighteen bat species live within the EIS area. The rare spotted bat has been mist netted in the Fort Pierce and Littlefield areas. The construction of man-made water developments over the last 100 years has increased the distribution of bats in the EIS area. Although practically all earthen stock tanks and dikes are available to bats, many are undependable water sources. Habitats lacking water probably support relatively poor bat faunas.

The desert cottontail and the blacktailed jackrabbit in the EIS area range from the ponderosa pine forests to the low deserts. The desert cottontail lives in areas with a fairly dense shrub layer. Protective cover in open habitats along washes and canyon bottoms is extremely critical. Livestock heavily use wash and canyon bottoms on many allotments in open habitats, eliminating cover that could be used by cottontails.

NONGAME BIRDS

Approximately 261 species of nongame birds inhabit the EIS area as residents or migrants. The species density of birds within an area depends on the number of niches within a habitat. For example, pinyon-juniper woodland provides a variety of niches and has one of the most diverse bird communities. The grassland type, on the other hand, supports meager birdlife because it has so few niches.

In a study of breeding bird densities of selected habitat types within the EIS area, Riffey (1977) found that the various habitat types supported different densities of birds (table 2-13). Of the undisturbed habitats, the pinyon-juniper type supports the greatest number of breeding birds. The study of chained pinyon-juniper areas indicates that chaining can adversely or beneficially affect bird populations, depending on how the treatment is applied.

VEGETATION MANIPULATION

A total of 51,630 acres of habitat in the EIS area, mostly pinyon-juniper woodland, has been modified through vegetation manipulation. Land treatment, however, decreases in structural complexity, removes some available niches, and creates an ecologically simpler habitat and avifauna.

The importance of maintaining structural height and diversity is well documented. MacArthur and MacArthur (1961) and Ohmart (1979) demonstated that bird species diversity is related to foliage height and diversity.

Early successional birds invade recently treated areas. Although many invader species are attracted to treated areas by the increased food and cover, little evidence supports the theory that creating more edge actually increases species diversity on treated areas (Balda, 1975).

Many bird species attracted to edges have broad ranges of tolerance, good powers of dispersal, and high reproductive rates and are in no immediate danger of habitat destruction or deterioration. Species with narrow ranges of tolerance and minimal powers of dispersal need our attention but seldom are edge species (Balda, 1975).

BIRDS OF PREY

Twenty-five species of raptors are believed to inhabit the EIS area. The broad-winged hawks include the redtail—the most abundant nester, Swainson's, the ferriginous, and roughleg hawks. The golden eagle is a resident nester. Occasionally bald eagles are sighted in Mainstreet Valley and the Virgin Mountains during winter. Prairie falcons, showing territorial behavior, have been observed in various canyons along the Grand Wash Cliffs, but no active nests have yet been located. The peregrine falcon and the merlin are rare winter migrants. Kestrels reside yearlong in the EIS area, being particularly abundant during spring and fall migrations.

The woodland hawks (accipiters) are found in the pinyon-juniper woodlands, ponderosa pine forests, and riparian habitats. Cooper's hawks, goshawks, and sharp-shinned hawks occur throughout the EIS area in wooded areas.

Forty-two miles of riparian and semiriparian habitat provide suitable nesting habitat for black hawks.

The most abundant nocturnal raptors are the great horned, pygmy, flammulated, long-eared, and screech owls. Spotted owls, although not verified, probably reside in the ponderosa pine, riparian, and canyon habitats.

The current condition of local raptor populations primarily depends on the habitat conditions of prey species. No data exist on the status of prey populations in the EIS area.

WATERFOWL AND SHOREBIRDS

Some 24 species of waterfowl and 51 species of shorebirds use aquatic habitats in the EIS area. Virtually all 75 species are migrants and peak in numbers during spring and fall migrations. Stock reservoirs, spring-fed ponds, and riparian areas along the Virgin River and Beaver Dam Wash are the major waterfowl and shorebird habitats. Many stock reservoirs, however, dry up in the late spring and summer and do not provide nesting habitat.

Most of the aquatic habitats provide only resting areas for migrant species, since condition of shoreline vegetation and vegetation near reservoirs is unsatisfactory.

AMPHIBIANS AND REPTILES

Twelve species of amphibians and 48 species of reptiles, including 23 species of snakes, occupy various habitats in the EIS area. Most amphibians inhabit aquatic habitats, such as springs, riparian areas, stock tanks, and natural bedrock ponds. The red spotted toad, Great Basin spadefoot toad, and woodhouse toad are the three most common terrestrial species. The leopard frog and canyon tree frog, on the other hand, are confined to more permanent water sources: springs and riparian areas. Tiger salamanders occur in stock ponds with semipermanent water. The majority of EIS-area spring and riparian habitats are in poor condition.

TABLE 2-13
ARIZONA STRIP BREEDING BIRD SPECIES

Plot	No. of Breeding species 1976	No. of Breeding species 1977	No. of Species using area* 1977	No. of Breeding pairs/100 acres 1976	No. of Breeding pairs/100 acres 1977
Untreated Plots					
1. Grassland	*	3	13	*	19
2. Sagebrush	*	2	11	11	40
3. Ponderosa Pine	12	18	11	94	92
4. Mature Pinyon-Juniper	13	14	10	129	108
Treated Pinyon-Juniper Plots					
5. Open Chained	*	7	19	*	50
6. Island Chained	14	10	26	135	102
7. Peninsula Chained	*	15	11	*	161

* No data for 1976
Source: Riffey, 1977

The construction of stock reservoirs by operators has provided additional habitat, especially for terrestrial toads.

The desert tortoise, a species listed by the State of Arizona as sensitive, occupies 118,833 acres (low density) and 87,911 acres (high density) on the Beaver Dam Slope and Pakoon areas in the low desert vegetation types. (See map 2-4.)

Tortoise populations on the Beaver Dam Slope in Utah were estimated at 2,000 or 25 individuals per square mile before 1936 (Woodbury and Hardy, 1948). Collecting, killing, and competition from domestic livestock for food have reduced the tortoise population of Beaver Dam Slope to 300 or 5 tortoises per square mile. Under the present 5.5 percent annual rate of decline, in 40 years less than 40 tortoises will remain—a population probably too low to recover (Coombs, 1977).

Preliminary data from the Arizona population (Beaver Dam Slope) indicate a more balanced age structure (table 2-14) when compared to other populations. Remains from 107 shells, however, indicated that 20 percent of the area's tortoise population had died within a 5- to 7-year period. Such a high rate of mortality is difficult to explain, since the young age structure of shell remains indicate significant recent reproduction. The sex ratio for the 1977-78 season was 167 males to 100 females (Hohman, 1978).

Coombs (1977) found on the Beaver Dam Slope in Utah an overall 38 percent dietary overlap between cattle and tortoises. Hohman (1978) identified the monthly diet overlap on the slope in Arizona as follows:

May 1977	16.22 percent
April 1978	57.4 percent
May 1978	17.76 percent

The percentage of dietary overlap is significant in view of tortoise mobility and range conditions of allotments in tortoise habitat. Palatable perennial grasses on the slope have decreased because of excessive past and present livestock grazing (Woodbury and Hardy, 1948).

The population condition of tortoises in the Pakoon area is undetermined. BLM field investigations indicate that populations are scattered and of low density. Burge (1979) estimated the population densities of tortoises in the Pakoon to range from 0 to 50 per square mile. On the basis of 10 transects, she calculated population densities from total tortoise sign scats and burrows.

Desert tortoise habitat condition is shown on table 2-15.

The Gila monster ranges in elevation from 3,600 feet (blackbrush and creosotebush vegetation subtypes) to 1,800 feet (creosotebush type) in the EIS area. Gila monsters have been sighted on the Beaver Dam Slope and in the Pakoon area.

The most abundant species of lizards within the EIS area include the side blotched, desert spiny, collared, striped plateau, western whiptail and zebra-tailed. The desert iguana, long-tailed brush, and tree lizards are keyed to sandy substrates and are less abundant.

Habitats with increased plant structures (expressed as plant species diversity and plant volume density) support more lizard species than those with fewer plant structures (Pianka, 1967).

Five species of rattlesnakes occur in the EIS area: Mojave, speckled, sidewinder, Great Basin, and black-tailed. The gopher snake, coachwhip, common kingsnake, and striped whipsnake are the most common nonvenemous snakes.

ARTHROPODS

Many species of arthropods are important food sources for bats, small mammals, birds, lizards, and frogs. No endangered insects have been identified in the EIS area.

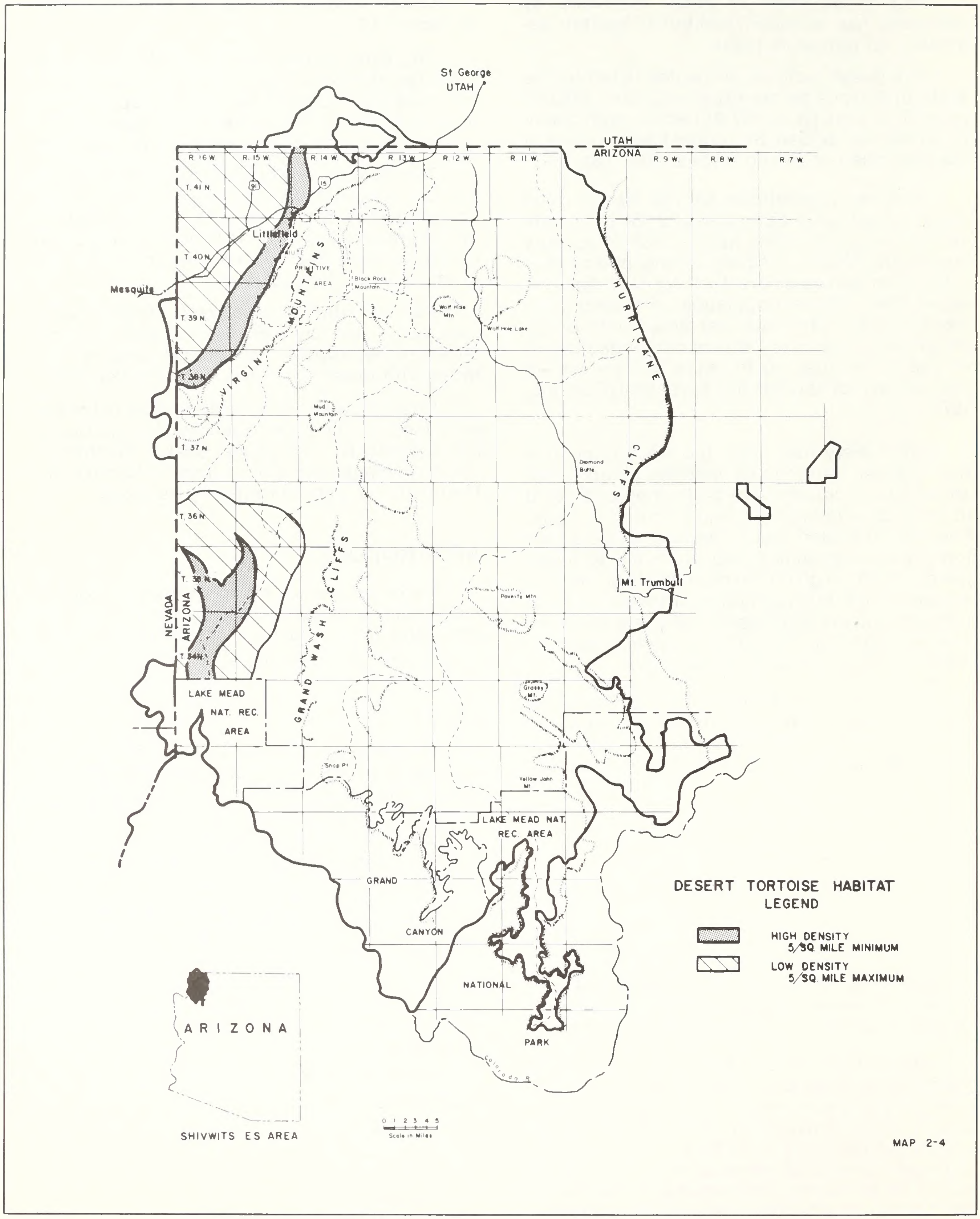
FISH

The EIS area has 47 miles of aquatic habitat, consisting of the Virgin River and Beaver Dam Wash. The Virgin River is typical of desert streams, highly varying in water levels and always carrying high sediment loads (Cross, 1975). During summer and fall droughts approximately 17 miles are dry.

Seven nonnative and six native fishes have been found in the Virgin River in Arizona (Cross, 1975):

Native	**Nonnative**
Woundfin Minnow*	Red Shinner
Virgin River Roundtail Chub**	Channel Catfish
Virgin River Spinedace***	Black Bullhead
Speckled Dace	Mosquito Fish
Flannelmouth Sucker	Largemouth Black Bass
Desert Sucker	Green Sunfish

*Endangered species
**Pending listing as an endangered species
***State listed sensitive species


St George
UTAH
UTAH
ARIZONA
R. 16 W.
R. 15 W.
R. 14 W.
R. 13 W.
R. 12 W.
R. 11 W.
R. 9 W.
R. 8 W.
R. 7 W.
T. 41 N.
T. 40 N.
T. 39 N.
T. 38 N.
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T. 36 N.
T. 35 N.
T. 34 N.
91
15
Littlefield
Mesquite
PAIUTE PRIMITIVE AREA
Black Rock Mountain
Wolf Hole Mtn
Wolf Hole Lake
VIRGIN MOUNTAINS
HURRICANE CLIFFS
Mud Mountain
Diamond Butte
GRAND WASH CLIFFS
Poverty Mtn
Mt. Trumbull
NEVADA
ARIZONA
LAKE MEAD NAT. REC. AREA
Grassy Mt.
Snap Pt
Yellow John Mt
LAKE MEAD NAT. REC. AREA
GRAND CANYON NATIONAL PARK
Colorado R.
DESERT TORTOISE HABITAT
LEGEND
HIGH DENSITY 5/SQ. MILE MINIMUM
LOW DENSITY 5/SQ. MILE MAXIMUM
ARIZONA
SHIVWITS ES AREA
0 1 2 3 4 5
Scale in Miles
MAP 2-4

TABLE 2-14
COMPARISON OF VARIOUS DESERT TORTOISE STUDIES

	AGE STRUCTURE[a]					SEX RATIOS				
Area	Adult 214 mm	Sub-Adults 171-214 mm	Juvenile 101-170 mm	Young 61-100 mm	Hatchling 61 mm	Male/Female 100	% Male	% Female	Natality[b]	Mortality[c]
Picacho Peak, Ariz. (Schwartzmann, 1978)	69	27	4							2
Arden Study Area Nye Co., Nev. (Burge and Bradley, 1976)	55	17	18	10	1	136:100	58	42		4.2
Salt Wells Valley, Calif. (Berry, 1974a)	58	17	19	3	3					5
Desert Tortoise Natural Area, Kern Co., Calif. (Berry, 1974b)	42	14	33	10	2	87:100	47	53		
Beaver Dam Slope, Utah (Woodbury and Hardy, 1948)	90	9	1			66:100	40	60	1.74	Higher
Beaver Dam Slope, Utah (Coombs, 1977)	72	18	9		1	236:100	70	30	1.74	4.57
Beaver Dam Slope, Ariz. (Hohman, 1978)	30	30	27	10	3	167:100	63	37	4	20[d]

(a) Percent of population in each age class
(b) Percent natality (annual)
(c) Percent mortality (annual)
(d) 1977 season only

Source: Data gathered by Judy Hohman, principal investigator, Beaver Dam Slope Desert Tortoise Study (BLM Contract).

TABLE 2-15
DESERT TORTOISE DATA BY ALLOTMENT

Allotment	Acres of Habitat and Condition*			Range Trend	AUMs Allocated	Season of Use
	Good	Fair	Poor			
Beaver Dam Slope			34,227	Static	30	Yearlong
Littlefield Community	3,025		26,824	Static	38	Yearlong
Littlefield Free Use		780	2,043	Static	2	Yearlong
Mesquite Community			16,205	Static	30	Yearlong
Mormon Well	2,016		13,373	Static	29	Yearlong
Mosby-Nay		1,571	5,807	Static	9	Yearlong
Pakoon		1,712	19,613	Static	20	Yearlong
Pakoon Spring		16,549	8,795	Static	24	Yearlong
Tassi			32,991	Static	45	Yearlong
Wolfhole Canyon		1,422	6,914	Static	20	Yearlong
					247	

---

* Habitat condition is based on livestock forage conditions and does not necessarily reflect true habitat conditions.

The food habits of desert fishes vary from an omnivorous to a more carnivorous diet. The following summary of research on the diet of woundfin minnow, an endangered species, is outlined in the *Woundfin Recovery Plan* (Woundfin Recovery Team, 1979).

Cross (1975) found the following food items in stomach analyses: amorphous material (presumably organic) and sand grains were most abundant; aquatic insect larvae were common; filamentous algae and organic matter occurred in about half of the individuals; and amphipod larvae were found in two specimens.

Winget and Baumann (1977) examined 16 woundfin from two collection periods and found insects the most common food item, especially diptera and stonefly larva.

Cope and Yarrow (1875) found that the teeth and intestines of the plagopterines (minnows) suggest carnivorous habits. The relative length of the gut suggests that algae and organic matter do not provide much food value, but bacteria, protozoans, and microalgae attached to large algae and organic particles may supply nutrients or aid in the breakdown of plant material.

THREATENED AND ENDANGERED SPECIES

The Shivwits EIS area contains two federally listed endangered species and two species pending listing. It also contains nine State-listed sensitive species.

The endangered peregrine falcon is a rare winter migrant to the EIS area. Although Mohave County is within the historic breeding range of the peregrine, no confirmed sightings have been recorded during the breeding season in the spring and summer. The distribution of migrant or resident peregrines is unknown.

The endangered woundfin minnow occupies approximately 36 miles of the Virgin River in Arizona. The Woundfin Recovery Team (1979) is monitoring the population status of the woundfin, but the woundfin's present habitat condition is unknown.

The Virgin River roundtail chub is under review for possible listing as an endangered species (U.S. FWS Memo Sept. 22, 1977). The Virgin River spinedace is classified as a sensitive species by the State of Arizona.

The U.S. Fish and Wildlife Service is reviewing the desert tortoise throughout its range to determine if endangered status is warranted. Two proposals were published in Volume 43, No. 164 of the Code of Federal Regulations on August 23, 1978. One requested a formal review of the desert tortoise in New Mexico, Arizona, Utah, California, and Nevada. The other asked for comments on proposed endangered status and critical habitat designations on the Beaver Dam slope population in Utah.

The present population and trend of the desert tortoise on the Beaver Dam slope in Arizona is unknown. (Refer to Amphibian and Reptile section.) This population is currently under study.

The black hawk, a rare summer resident in the EIS area, has been observed in the Black Rock area and near Littlefield. Its main habitat includes riparian and semiriparian zones that support sufficient invertebrate prey populations. The Virgin River, Beaver Dam Wash, and scattered spring habitats throughout the EIS area contain potentially suitable black hawk habitat. The current productivity of present and potential black hawk habitat is below an acceptable level.

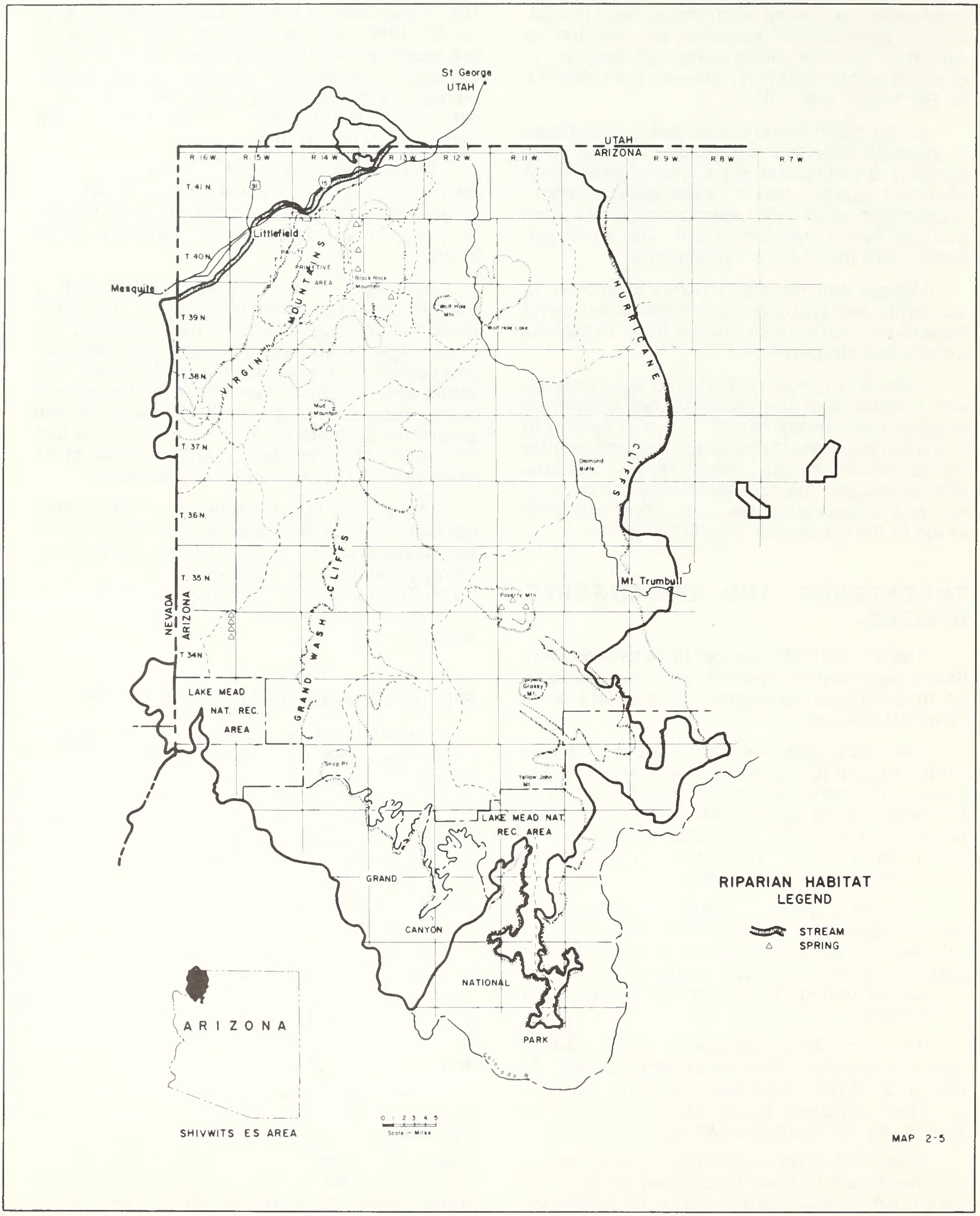
Many of the larger reservoirs and the limited riparian zones of the EIS area offer snowy egrets and black-crowned night herons resting and feeding habitats during fall and spring migrations. The condition of shoreline vegetation is, however, unsatisfactory for these State-listed species.

RIPARIAN AND SPRING HABITATS

Riparian and spring habitats are the most productive communities within the EIS area. A riparian community or plant association is one that occurs in or next to a drainageway or flood plain and has species or life forms different from those of the immediately surrounding nonriparian climax (Lowe, 1964). Riparian vegetation reflects additional soil moisture along a drainageway. See map 2-5 for riparian habitat and chapter 2, Vegetation, for acreages involved.

Spring habitats in the EIS area vary from half-acre irrigated wet meadows to small ephemeral seeps. The majority of springs are small point sources. Riparian habitats are associated with perennial and intermittent streams, washes, and reservoirs.

Jahn and Threfethen (1972) stated that "regardless of species, riparian vegetation is the most valuable wildlife habitat in Arizona." These areas are "oases" in the desert for wildlife. Spring and riparian habitats provide not only a water source for many land animals but are ex-


St George
UTAH
UTAH
ARIZONA
R. 16 W
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T. 40 N.
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T. 37 N
T. 36 N
T. 35 N
T. 34 N
Littlefield
Mesquite
PAIUTE
PRIMITIVE
AREA
Black Rock
Mountain
VIRGIN
MOUNTAINS
Wolf Hole
Mtn
Wolf Hole Lake
HURRICANE
CLIFFS
Mud
Mountain
Diamond
Butte
GRAND
WASH
CLIFFS
Mt. Trumbull
Poverty Mtn
NEVADA
ARIZONA
LAKE MEAD
NAT. REC.
AREA
Grassy
Mt.
Snap Pt
Yellow John
Mt
LAKE MEAD NAT.
REC. AREA
GRAND
CANYON
NATIONAL
PARK
Colorado R.
RIPARIAN HABITAT
LEGEND
STREAM
SPRING
ARIZONA
SHIVWITS ES AREA
0 1 2 3 4 5
Scale in Miles
MAP 2-5

tremely important as food sources and reproductive sites for certain species. Amphibians, particularly the canyon tree frog and leopard frog, depend highly on riparian habitats.

High terrestrial and aquatic insect populations associated with riparian areas support various species of lizards, snakes, bats, and nongame birds. Predacious birds, snakes, and mammals hunt these productive environments because of the abundance of prey.

Spring and riparian habitats accessible to livestock are generally deteriorated. These habitats produce far below their natural potential because of soil compaction and heavy vegetation utilization. Livestock eat young cottonwood and willow seedlings, preventing these trees from attaining maturity to replace older trees.

BURROS

In the EIS area only the Tassi allotment has feral burros. About half of this allotment, 60,144 acres, lies within Lake Mead National Recreation Area (NRA) and Grand Canyon National Park. BLM jointly shares the management responsibility for the burros with the National Park Service (NPS). An estimated 100 burros inhabit the allotment. The Grand Wash Management Framework Plan (MFP) recommends allocating 500 AUMs of forage for burros.

Burros naturally cross the administrative boundary between Lake Mead National Recreation Area and BLM-administered public lands. Burros appear to move with the seasons. Some move off the allotment into Nevada to the west, but the majority stay on the allotment year round.

Burros generally inhabit areas having permanent water. Most of the burros stay within 2 or 3 miles of Lake Mead or near several springs in lower Grand Wash. Cattle also tend to stay in this same area. Consequently, grazing is high near these waters, and range condition is poor. During the cooler, wetter part of the year, burros scatter more, some moving several miles from the Lake Mead-Grand Wash area. Table 2-16 summarizes burro habitat in the EIS area.

CULTURAL RESOURCES

Cultural resources are commonly discussed as sites and their prehistorical or historical value. Sites consist of any combination of artifacts (objects showing human usage or manipulation) and features (structures, fire pits, or rock art panels). All sites constitute a fragile and nonrenewable resource—human history.

ARCHAEOLOGICAL RESOURCES

Archaeological resource data for this EIS were compiled from eight contract archaeological surveys, range improvement project clearances, the Hot Desert EIS (BLM, 1978a), and a contract archaeological cultural resource assessment. Table 2-17 outlines these eight surveys. In addition, Lipe and Thompson (1977) identified 52 more sites within the EIS area.

No research-oriented or predictive research designs, however, have been conducted within the EIS area. Thus, cultural resources must be discussed by their potential as extrapolated from predictive designs conducted in adjoining areas. The known 428 archaeological sites reveal that the cultural history of the EIS area is long and varied, starting approximately 12,000 years ago.

Table 2-18 summarizes site density projections for the EIS area. Information from the Vermillion Grazing EIS (BLM, 1979) was not included because it is not directly comparable. Where comparisons could be made, cultural resource data in the Vermillion EIS tend to support the projections/predictions, but at lower site densities. Table 2-18 reveals that the EIS area does not have the potential for extremely high site densities.

HISTORICAL RESOURCES

Historical resource data were compiled from the BLM Arizona Strip District cultural resource files and from Belshaw's (1978) "History Resource Study" contracted by the National Park Service (NPS).

The EIS area is extremely rich in historic remains, dating from 1776 and continuing through the 1940s with attempts at dry farming and Civilian Conservation Corps projects. Several trails, roads, and activity sites have eligibility for the National Register of Historic Places (NRHP). The Temple and Honeymoon Trails have been nominated to the NRHP, and NPS is studying the Dominguez-Escalante Trail as a potential national historic trail.

VISUAL RESOURCES

The BLM Visual Resource Management (VRM) system evaluates the landscape by the quality of its scenery (scenic quality ratings), the sensitivity of an area to visual change (visual sensitivity levels), and the distance of an area from viewing points (visual zones). Visual resource specialists map these characteristics

TABLE 2-16
BURRO HABITAT SUMMARY

Allotment	Vegetation Type	Condition	Trend	Present Burro Population	Burro Population Objective	Livestock-Burro Conflict	
						Degree	Resource
Tassi	Desert Shrub	Poor	Static	100	100	Moderate	Forage, Water

TABLE 2-17
CULTURAL RESOURCE SURVEYS

Name	Year	Type	Acreage/Sites
I-15	1966	Clearance	(*)/ 38
Los Angeles Water and Power	1973	Clearance	(*)/ 2
Alton Pipeline	1974	Clearance	(*)/ 4
Sullivan Canyon	1974	Clearance	960/ 34
Arizona Strip AH	1975	Clearance	(*)/ 10
Adjacent Lands Survey	1977	Inventory	432/ 49**
LMRA	1977/78	Inventory	8,960/206
Range Improvement	Fiscal Year 1978	Clearance	2,369/ 25
Range Improvement	Fiscal Year 1979***	Clearance	408/ 6
Geophysical Exploration	Fiscal Year 1979***	Clearance	500/ 2
Total			13,269/376

* Acreage not available. Surveys involved corridors.

** Sites as an "aggregate" eligible for National Register of Historic Places

*** Year to date

TABLE 2-18
ARCHAEOLOGICAL SITE DENSITY OF LIPE-THOMPSON PROJECTIONS AND HOT DESERT PREDICTIONS

Lipe and Thompson (1977)			Hot Desert ES (BLM, 1978^a)	
Location	Projected Site Density	Variable Compared	Location	Projected Site Density
No lowlands				
Fort Pierce	Low	Desert Shrub zone Grasslands	Fort Pierce Allotment	$4-12/mi^2$ $0-3/mi^2$
Littlefield	High	River drainage	Gunlock-Santa Clara Allotment	$25-40/mi^2$
Grand Wash Lowlands	Possibly high	Desert Shrub/ Creosotebush	Fort Pierce Allotment	$4-12/mi^2$
Hurricane Wash Grasslands	Low	Grasslands	Fort Pierce Allotment	$0-3/mi^2$
Highland Areas	Moderate	Pinyon-juniper/ Sagebrush	Beaver Dam and Little Creek Mts.	$13-24/mi^2$
Mountainous Regions	Medium	Pinyon-juniper/ Sagebrush/Ponderosa pine	Next to Pine Valley Mountain	$0-3/mi^2$ to $25-40/mi^2$ near water
Bench Regions	Medium	Cresosotebush/ Joshua tree	Beaver Dam Wash and Fort Pierce	$0.3/mi^2$ to $4-12/mi^2$
Inner Canyons	High	Potential for flood plain agriculture	Beaver Dam Wash and Santa Clara River	$25-40/mi^2$

and use them to compile a composite map on which they assign areas to one of five possible VRM classes. They then use VRM classes to determine the degree of allowable contrast for a proposed management activity or project.

VRM classes, their objectives, and required management practices are as follows:

CLASS I—Applies only to designated special areas, such as wilderness, primitive areas, and natural areas, where management is to be restricted. Legislation or policy establishes this quality standard. Class I permits only natural ecological changes. VRM classifications have not been applied to NRA, although, by definition, the entire NRA would be Class I.

CLASS II—Changes in any of the basic elements (form, line, color, or texture) caused by management should not be evident in the characteristic landscape.

CLASS III—Changes in the basic elements caused by management may be evident in the characteristic landscape, but the change should remain subordinate to the visual strength of the existing character.

CLASS IV—Changes may subordinate the original composition and character but must reflect what could be a natural occurrence within the characteristic landscape.

The EIS area has no Class V lands.

VRM classes for the EIS area are delineated on map 2-6. Following is the approximate acreage in each VRM class, excluding Lake Mead NRA:

VRM Class	Acreage
I	35,092
II	271,590
III	229,555
IV	815,178

Table 2-19 summarizes the approximate number of existing developments (intrusions) in each VRM class, excluding Lake Mead NRA.

LAND USE

LIVESTOCK GRAZING

Historically residents in and around the Shivwits EIS area have engaged in farming and livestock production. Livestock operations in the EIS area continue to impact the economies of Washington and Kane Counties, Utah and Clark County, Nevada, as well as Mohave County, Arizona. Of the 60 livestock operators in the EIS area, 38 live in Washington County, 6 live in Clark County, 7 live in Kane County, and 3 live elsewhere in Utah or Arizona. Six operators live in Mohave County within the EIS area.

The livestock operations and allotments in the EIS area vary considerably and may involve complex relationships. An operation may occupy a single allotment, parts of one or more allotments, or more than one allotment. An allotment itself may be enclosed within a single boundary or may consist of two or more separated areas or pastures.

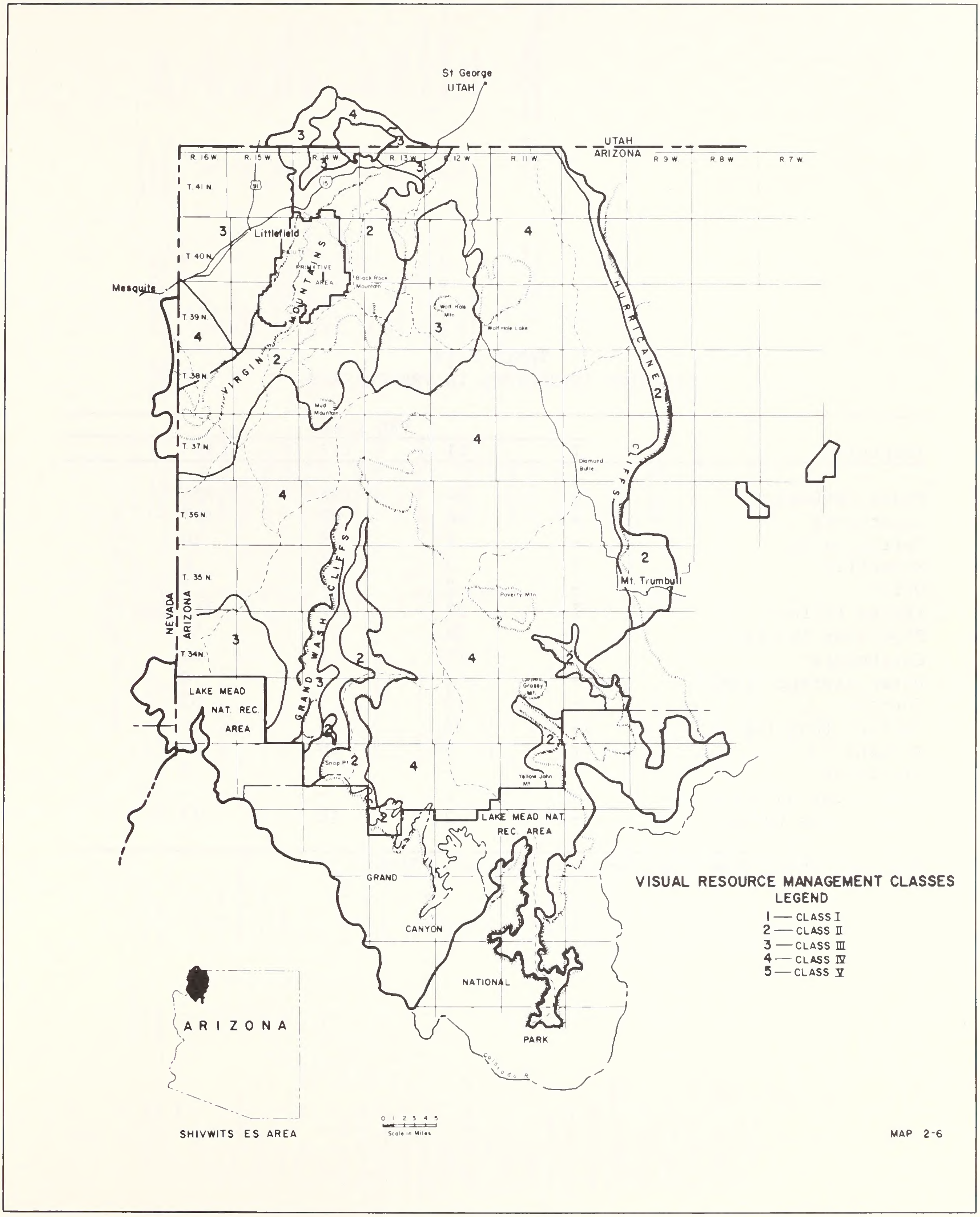
A livestock operation may be run by an individual, a family, or a corporation. Generally an operation is run independently, but operations may cooperate in various responsibilities, especially if they occupy the same allotments. Members of family operations or corporations generally share operating expenses on an equal AUM percentage basis.

Operations that run in common on the same allotment may run independently of each other. Each operator may perform his own tasks and pay his own expenses with little or no interaction with other operators in the allotment.

Table 2-20 lists livestock operations in the EIS area by operation size, showing existing and proposed allotments used in the operation. Table 2-20 also shows percentages of existing allotments included within an operation. For example, livestock operations 1 and 2 are in Group I herd size (less than 75 head), and each has a 50 percent share in Little Wolf allotment. Operation 44 is in Group III herd size (between 151 and 300 head) and has 100 percent of the Cottonwood and Sullivan Canyon allotments.

More than half (32) of the livestock operators have either additional private or leased lands or other grazing permits from BLM or the Forest Service used for raising forage or grazing livestock. Generally livestock operators use these lands as a part of their operations on the Arizona Strip. Approximately 40 livestock operations fully depend on the Arizona Strip grazing permits, but most of the operators in the EIS area have other jobs or sources of income to supplement their operations.

Operators in the EIS area graze approximately 9,585 cattle and 62 horses each year on 1,717,341 acres of Federal land intermingled with State and private land. The total Federal AUMs allowed—current active privileges—is 106,769. The average licensed use for the past 5 years has been 82,953 AUMs per year.



SHIVWITS ES AREA

MAP 2-6

TABLE 2-19
EXISTING INTRUSIONS IN VRM CLASSES

Intrusion	VRM Class I	II	III	IV
Roads (miles)	6	84	184	1,726
Reservoirs	-	46	29	197
Cattleguards	-	8	9	30
Windmills	-	3	14	2
Wells	-	2	-	2
Fences (miles)	7	39	127	758
Pipelines (miles)	-	38	19	52
Catchments	-	13	7	26
Water storage tanks	-	2	-	8
Corrals	-	13	5	83
Springs (developed)	14	23	5	25
Troughs	2	9	10	29
Airfields	-	-	2	5
Communication Sites	-	1	-	-
Power Lines (miles)	-	2	12	18

Source: Grand Wash Unit Resource Analysis, Step 3

TABLE 2-20
LIVESTOCK OPERATIONS IN THE EIS AREA BY SIZE*

Livestock Operation	Existing Allotments in the Operation	Share of the Existing Allotment %	Proposed Allotment
	Group I		
1	Little Wolf	50	Little Wolf
2	Little Wolf	50	Little Wolf
3	Whiterock-Soapstone	50	Whiterock-Soapstone
4	Duncan Tank	100	Duncan Tank
5	Sunshine	27	Sunshine
6	Sunshine	73	Sunshine
7	Lizard	100	Lizard
8	Wolfhole Lake	100	Wolfhole Lake
9	Beaver Dam Slope	34	Beaver Dam Slope
10	Beaver Dam Slope	10	Beaver Dam Slope
11	Beaver Dam Slope	16	Beaver Dam Slope
12	Beaver Dam Slope	11	Beaver Dam Slope
13	Purgatory	100	Purgatory
14	Beaver Dam Slope	5	Beaver Dam Slope
15	Pat's Pond	100	Pat's Pond
16	Diamond Butte	100	Diamond Butte
17	Iverson	100	Iverson
18	Mustang Spring	100	Mustang Spring
19	Beaver Dam Slope	8	Beaver Dam Slope
20	Beaver Dam Slope	5	Beaver Dam Slope
21	Littlefield Community Littlefield Free Use	15 25	Littlefield Community Littlefield Free Use
22	Littlefield Community	8	Littlefield Community
23	Littlefield Community Littlefield Free Use	15 25	Littlefield Community Littlefield Free Use
24	Littlefield Free Use	25	Littlefield Free Use
25	Littlefield Community Littlefield Free Use	16 25	Littlefield Community Littlefield Free Use
26	Quail Canyon	100	Quail Canyon
	Group II		
27	Pakoon Spring	100	Pakoon Spring
28	Whiterock-Soapstone	50	Whiterock-Soapstone
29	Mosby-Nay	100	Mosby-Nay
30	Last Chance	100	Last Chance
31	Link Spring	100	Last Chance
32	Sullivan Tank	100	Sullivan Tank
33	Mule Canyon Belnap West	100 100	Mule Canyon
34	Mt. Trumbull	100	Mt. Trumbull
35	Littlefield Community	35	Littlefield Community
36	Jackson Tank	100	Jackson Tank
37	Wolfhole Mountain Pocum Tank Lambing Starvation Point	50 100 100 100	Wolfhole Mountain
38	Wolfhole Mountain Cedar Wash Beaver Dam Slope	50 100 11	Wolfhole Mountain
39	Mormon Well	100	Mormon Well
40	Clay Spring	100	Clay Spring
41	Penns Well	100	Penns Well
42	Pa's Pocket Belnap	100 100	Pa's Pocket
43	Tassi	100	Tassi
	Group III		
44	Cottonwood Sullivan Canyon	100 100	Cottonwood Sullivan Canyon
45	Blake Pond	100	Blake Pond
46	Hidden and Sullivan	100	Hidden and Sullivan
47	Mesquite Community Mosby	100 100	Mesquite
48	Littlefield Community	11	Littlefield Community
49	Pakoon	25	Pakoon
50	Blackrock	100	Blackrock
51	Toquer Tank Little Tank Ivanpah	100 100 100	Toquer Tank Little Tank Ivanpah
	Group IV		
52	Jump Canyon Pakoon	100 22	Jump Canyon Pakoon
53	Mainstreet Shelly Snyder	69 100 100	Mainstreet Shelly Snyder
54	Mainstreet Poverty Mountain	31 100	Mainstreet Poverty Mountain
55	Wolfhole Canyon Spring Hiway Mine Valley, UT Cedar Pockets, UT	100 100 100 100	Wolfhole Canyon
56	Grassie Mountain Pakoon	100 53	Grassie Mountain Pakoon
57	Parashaunt Rosenberry	100 100	Parashaunt Rosenberry
58	Lower Hurricane	100	Lower Hurricane
59	Mud and Cane Spring	100	Mud and Cane Spring
60	Wildcat Home Ranch	100 100	Wildcat Home Ranch

* Based on herd size:

Group I - Less than 75 head
Group II - 75 to 150 head
Group III - 151 to 300 head
Group IV - Greater than 300 head

The EIS area has 64 allotments, many of which consist of single pastures. Thirty-six allotments are used yearlong, and 28 are used seasonally, mainly in the fall, winter, and spring. About half of these seasonal allotments are used only by one operation. A few operators move their livestock to private or Forest Service land in Utah.

Range Improvements

All allotments have various types of range improvements. (Plate 1 shows the existing range improvements on Federal land.) Some improvements, such as water developments, land treatments, and erosion control structures were developed for managing the public lands and resources. Others, such as fences, corrals, loading chutes, and dipping vats were developed for facilitating livestock management.

Generally operators have developed livestock facilities through permits issued by BLM. BLM has developed other improvements, such as erosion control structures and land treatments. Fences and water developments have been constructed by BLM, by operators separately, or by both through cooperative agreements. Operators have provided or constructed waters used as bases for grazing preferences.

Management Systems

Currently 47 allotments involving 1,119,879 acres and 66,805 AUMs of active privileges on Federal land are not managed under AMPs (see table 1-2). All of these allotments are cow-calf operations. A few (one to five) horses are run on about half the allotments. Twenty-two allotments are grazed seasonally, whereas 25 are grazed yearlong. Table 2-21 shows livestock production characteristics on AMP and non-AMP operations.

Sixteen allotments are being managed under AMPs, involving 597,462 acres of Federal land and 41,934 AUMs of active privileges. On these allotments all developments necessary to allow rotation grazing have been completed. Four are grazed seasonally, and 12 are grazed yearlong. All are managed as cow-calf operations. Table 2-22 shows average calf production on these allotments before and after AMP implementation.

RECREATION

Although sparsely populated, the EIS area lies close to numerous recreation lands of national interest, including Grand Canyon National Park and Lake Mead National Recreation Area. In contrast to these areas, which attract large numbers of visitors engaged in localized and intensively managed recreation, the EIS area attracts visitors engaging in a variety of dispersed activities.

Existing Use Areas

Two BLM-administered sites affected by the proposed action have been formally identified for management of their recreation resources (map 2-7):

1. Paiute Primitive Area—This area, comprising 35,092 acres of the Virgin Mountains, is the EIS area's only designated primitive area. Grazing is permitted throughout the area, and livestock have severely disturbed springs and associated wet meadows.

2. Virgin River Gorge Recreation Lands—The Virgin River Gorge is a spectacularly scenic attraction. To preserve its public scenic and recreation values, BLM has withdrawn over 23,070 acres from all forms of appropriation under the public land laws, including the mining laws. BLM can continue to lease minerals, but individuals can no longer establish mineral claims that can lead to private ownership of the land claimed. Grazing is permitted throughout the area, except within the 40-acre campground in the withdrawn area.

In addition to these formally designated sites, three trails are presently managed for their recreational value—the Dominguez-Escalante Trail, the Honeymoon Trail, and the Temple Trail (map 2-7). The Temple and Honeymoon Trails have been nominated to the National Register of Historic Places. The Dominguez-Escalante Trail presently is being studied for congressional designation as a national historic trail. Such a designation would incorporate it into the national trails system.

Proposed Designations

The draft Grand Wash Management Framework Plan (MFP) recommends additional designations for recreation management. Map 2-8 shows the locations of these proposals.

1. Environmental Study Area, Paiute Primitive Area—One objective identified in the Paiute Primitive Area Management Plan is to provide opportunity for environmental study. The plan further identifies the value of the area an an outdoor classroom to teach concepts in environmental education. With its excellent combination of

TABLE 2-21
LIVESTOCK PRODUCTION CHARACTERISTICS UNDER AMP AND NON-AMP MANAGEMENT

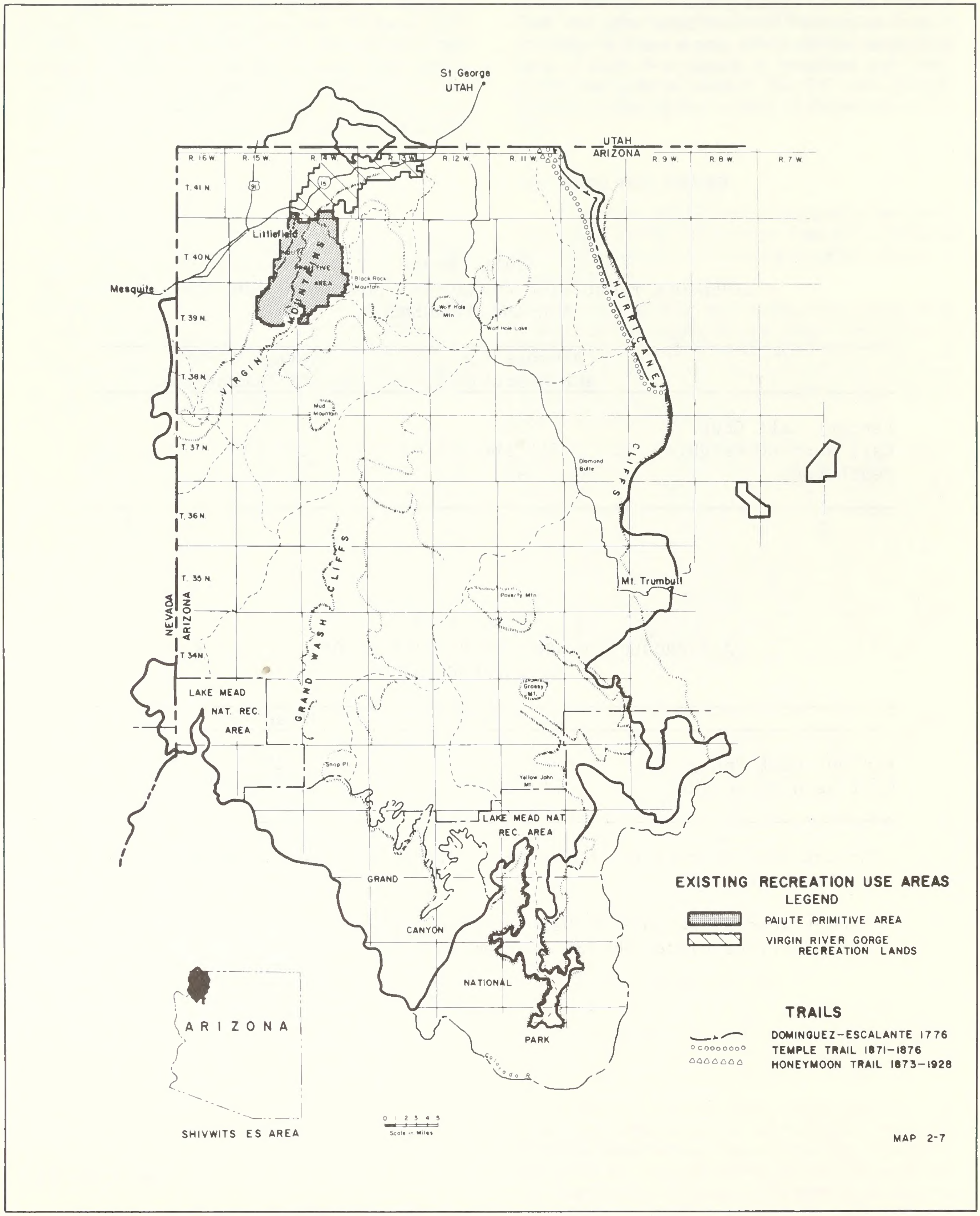
	Average for AMP Operations	Average for Non-AMP Operations
Percent Calf Crop	82%	75%
Calf Weaning Weights	365 lbs.	345 lbs.
Death Loss	4%	5%

TABLE 2-22
CALF PRODUCTION CHARACTERISTICS BEFORE AND AFTER AMP IMPLEMENTATION

	Before AMP	After AMP
Percent Calf Crop	67%	82%*
Calf Weaning Weights	347 lbs.	366 lbs.**

*Except calf crop in the Mainstreet allotment has declined since AMP implementation.

**Except weaning weights in Mainstreet and Lower Hurricane allotments have declined since AMP implementation.


EXISTING RECREATION USE AREAS
LEGEND
PAIUTE PRIMITIVE AREA
VIRGIN RIVER GORGE RECREATION LANDS
TRAILS
DOMINGUEZ-ESCALANTE 1776
TEMPLE TRAIL 1871-1876
HONEYMOON TRAIL 1873-1928
St George UTAH
UTAH
ARIZONA
NEVADA
ARIZONA
R. 16 W.
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ARIZONA
SHIVWITS ES AREA
0 1 2 3 4 5
Scale in Miles
MAP 2-7

scenic, historic, geologic, archaeological, and ecological values, the area is well suited for that purpose. The MFP recognizes that opportunity and recommends formal designation as an environmental study area.

2. Off-Road Vehicles (ORV) Designations—The only ORV designation for BLM-administered lands within the EIS area is for Paiute Primitive Area, which is closed to all ORVs. The draft Grand Wash MFP, however, recommends a designation (open, closed, or limited) for all public lands in the Shivwits Resource Area (map 2-8). In "open" areas, ORVs may be operated. "Closed" areas are temporarily or permanently closed to all ORV use. In "limited" areas, ORV operation is subject to restrictions, such as types and numbers of vehicles, time of use, and areas or trails used. In areas that the MFP identifies as "limited," ORV use is restricted to existing roads and trails. All lands administered by the National Park Service are closed to ORVs except on approved roads and trails.

Visitor Use

The EIS area represents a major semiprimitive open space recreation resource, which includes outstanding sightseeing, primitive, geologic, and archaeological-historical values.

An analysis of visitor use, based upon the extensive phase of BLM's Recreation Information System, attributes 122,287, 12-hour visitor days to public lands during 1975. Of this total, more than 85 percent involved general sightseeing through the Virgin River Gorge. All remaining visitor use (18,262 visitor days) involved more extensive recreation—hunting, hiking, nature study, photography, primitive camping, collecting, and off-highway sightseeing (table 2-23).

WILDERNESS

The Federal Land Policy and Management Act of 1976 (FLPMA) mandates an inventory of all roadless areas of 5,000 acres or more that have wilderness characteristics as described in the Wilderness Act of 1964 (see glossary). FLPMA further requires recommendations as to the wilderness suitability of those areas formally identified as natural or primitive before November 1, 1975. The results of this study are to be presented to the President by July 1, 1980. The Shivwits EIS area has one "instant" study area—Paiute Primitive Area.

Wilderness study procedures require that roadless areas smaller than 5,000 acres and all lands not possessing wilderness characteristics be returned immediately to unrestricted multiple-use management. All remaining inventory units meeting the size and characteristics are to be more intensively studied and managed to preserve their wilderness character until Congress either designates the unit as wilderness or releases it for full multiple-use management. Map 2-9 shows the locations of the inventory units being intensively reviewed.

ECONOMIC AND SOCIAL CONDITIONS

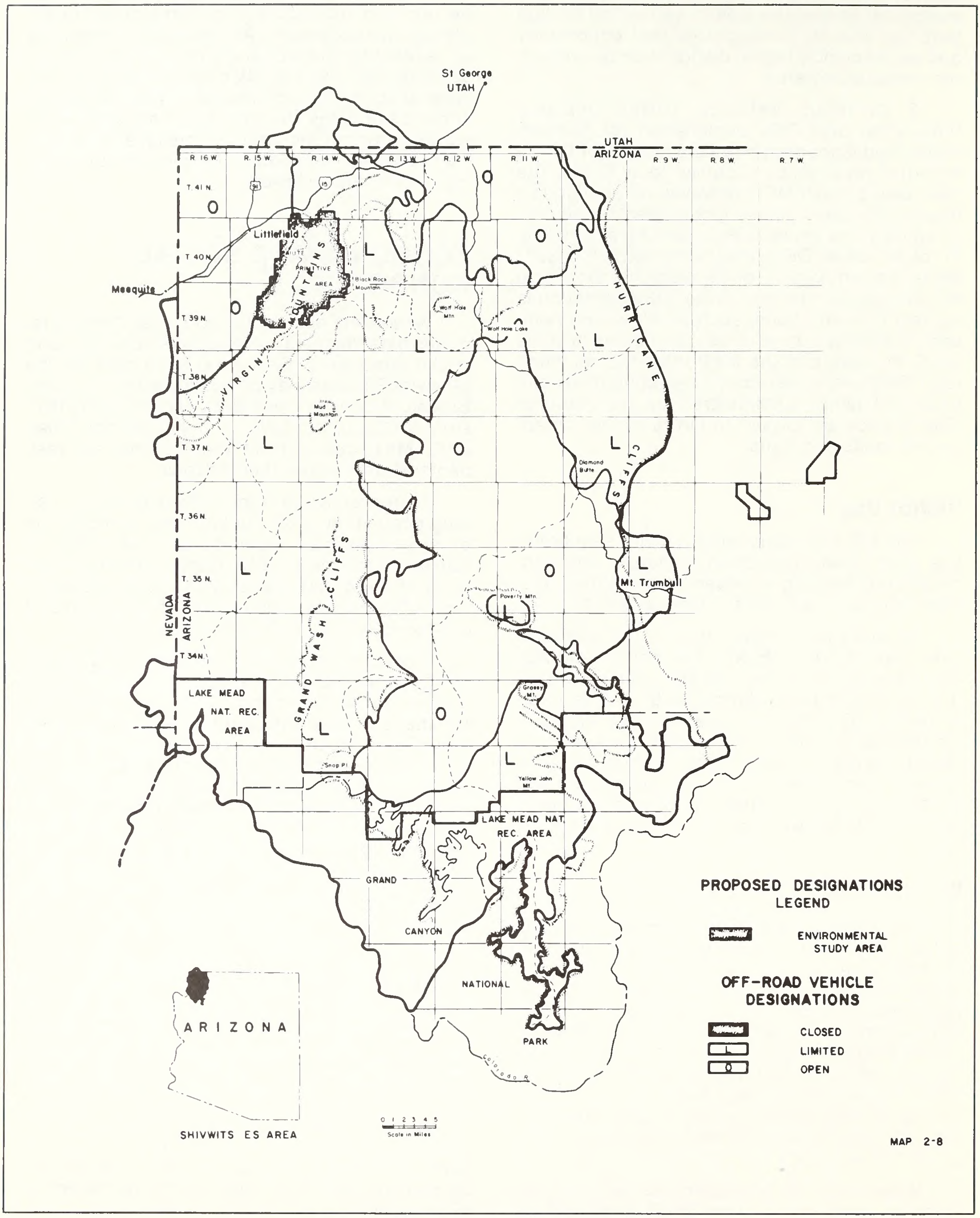
Assessing economic and social impacts requires data that best represent the economic and social conditions of an area. Such data for the Shivwits EIS area may be best obtained from the Bureau of Census's Mohave Census County Division (CCD) of Mohave County, Arizona (map 2-10). Most operators in the EIS area are residents of Utah rather than Arizona.

Moreover, aside from Littlefield with a yearlong population of 69, the EIS area has no towns of any population significance. The cities of Kanab, Hurricane, and St. George, Utah provide most of the goods and services for those working in the EIS area and provide the cultural and economic focus for the EIS area.

Because the region that would be affected by the proposed action extends beyond the EIS area's boundaries, much of the data presented for the EIS area will include Washington and Kane Counties, Utah as well as the entire Arizona Strip. This enlarged area will be referred to as the North Rim SEPA (Social-Economic Profile Area) since it is the same area studied in the North Rim Social-Economic Profile, a BLM planning document on file at the Arizona Strip District office in St. George, Utah. Table 2-24 presents socioeconomic data for North Rim SEPA and comparison areas.

POPULATION CHARACTERISTICS

The total 1970 population of the North Rim SEPA amounted to 18,425, of which 2,335 resided in the Arizona Strip and less than 100 lived in the Shivwits EIS area. The remaining 16,000 lived in Utah, and over 10,000 of these people lived in St. George. Between 1960 and 1970 the SEPA's population increased by 27 percent. During the same period Arizona's population increased by 36 percent, and Utah's population increased by 19 percent.

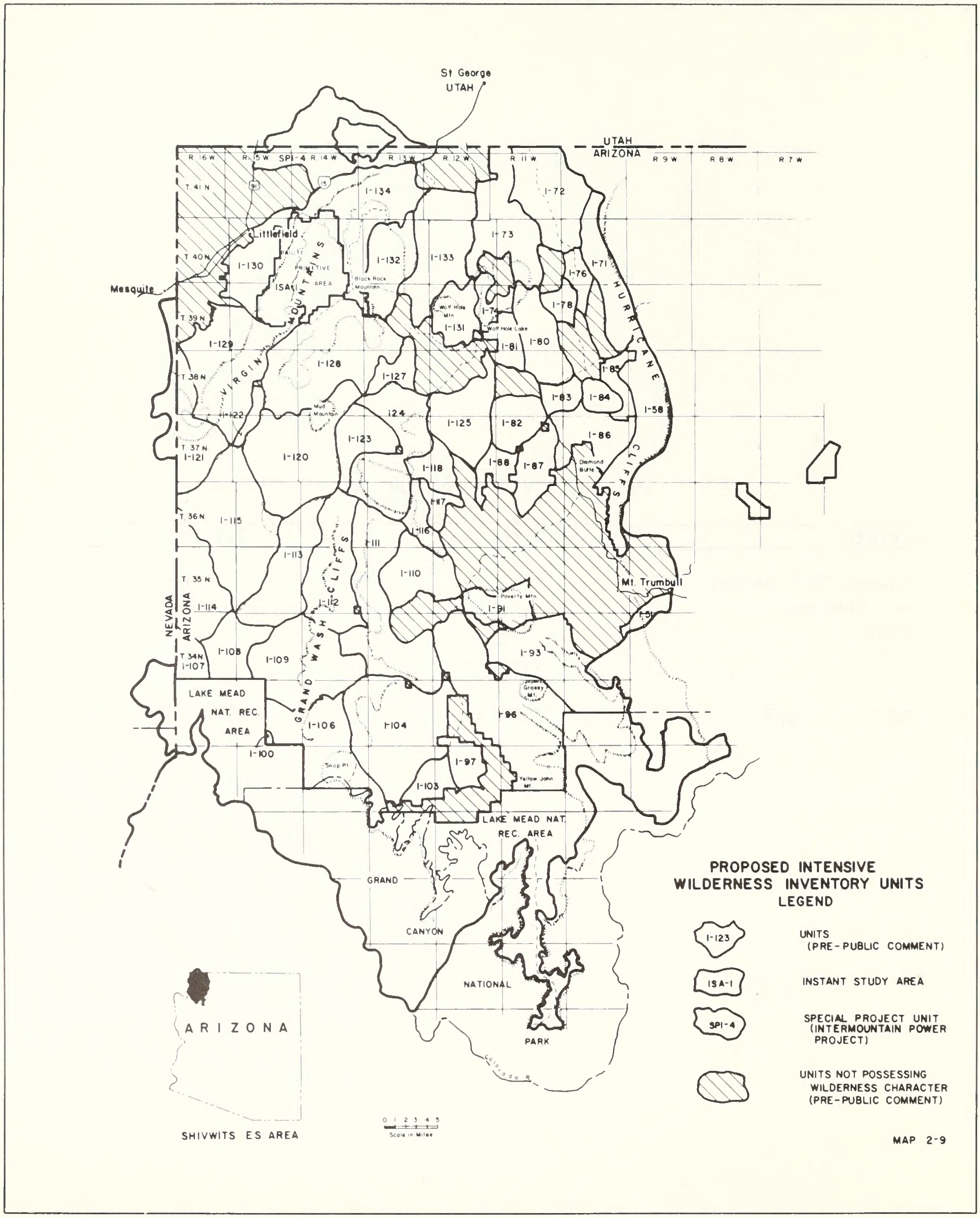

St George
UTAH
UTAH
ARIZONA
R. 16 W.
R. 15 W.
R. 14 W.
R. 13 W.
R. 12 W.
R. 11 W.
R. 9 W.
R. 8 W.
R. 7 W.
T. 41 N.
T. 40 N.
T. 39 N.
T. 38 N.
T. 37 N.
T. 36 N.
T. 35 N.
T. 34 N.
91
15
Littlefield
Mesquite
PAIUTE PRIMITIVE AREA
VIRGIN MOUNTAINS
Black Rock Mountain
Wolf Hole Mtn
Wolf Hole Lake
HURRICANE CLIFFS
Mud Mountain
Diamond Butte
Mt. Trumbull
Poverty Mtn
GRAND WASH CLIFFS
NEVADA
ARIZONA
LAKE MEAD NAT. REC. AREA
Grassy Mt.
Snap Pt.
Yellow John Mt.
LAKE MEAD NAT. REC. AREA
GRAND CANYON NATIONAL PARK
Colorado R.
O
L
ARIZONA
SHIVWITS ES AREA
0 1 2 3 4 5
Scale in Miles
PROPOSED DESIGNATIONS
LEGEND
ENVIRONMENTAL STUDY AREA
OFF-ROAD VEHICLE DESIGNATIONS
CLOSED
L LIMITED
O OPEN

MAP 2-8

TABLE 2-23
1975 RECREATION VISITOR USE

Activity	Visitor Use	Percent of Total
General Sightseeing	104,025	85.0
Deer Hunting	2,648	2.2
Camping	1,489	1.2
Other	14,125	11.6
Total	122,287	100.0

Source: Grand Wash Planning Unit - URA Step 3


St George
UTAH
UTAH
ARIZONA
R 16 W
R 15 W
SPI-4
R 14 W
R 13 W
R 12 W
R 11 W
R 9 W
R 8 W
R 7 W
T 41 N
T 40 N
T 39 N
T 38 N
T 37 N
T 36 N
T 35 N
T 34 N
Littlefield
Mesquite
PAIUTE PRIMITIVE AREA
ISA-1
VIRGIN MOUNTAINS
Black Rock Mountain
Wolf Hole Mtn
Wolf Hole Lake
Mud Mountain
Diamond Butte
Poverty Mtn
Mt. Trumbull
Snap Pt
Yellow John Mt
Grassy Mt
HURRICANE CLIFFS
GRAND WASH CLIFFS
NEVADA
ARIZONA
I-134
I-72
I-73
I-132
I-133
I-130
I-71
I-76
I-78
I-74
I-131
I-129
I-81
I-80
I-128
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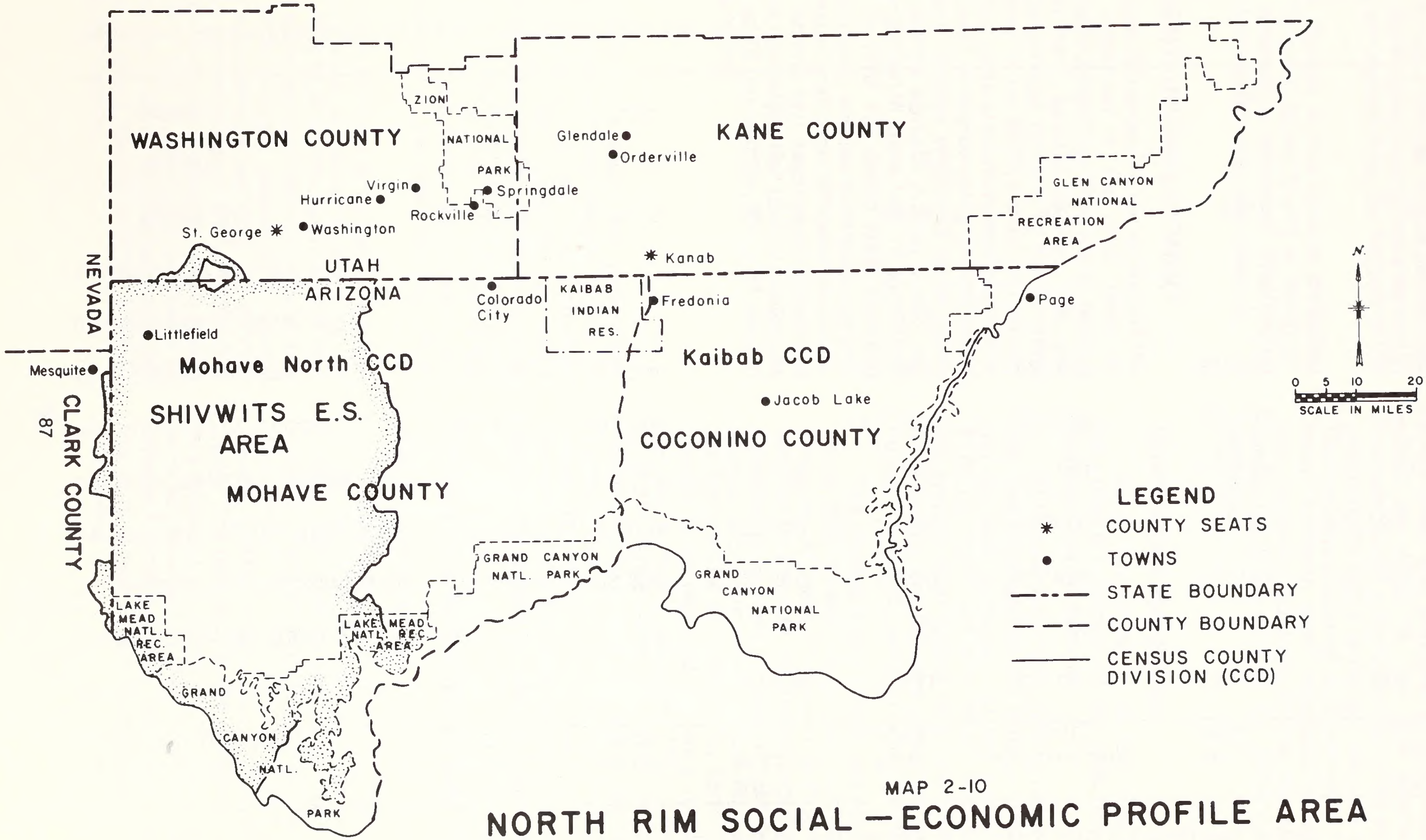
I-112
I-91
I-51
I-108
I-109
I-107
I-93
I-106
I-104
I-96
I-100
I-97
I-103
LAKE MEAD NAT. REC. AREA
LAKE MEAD NAT. REC. AREA
GRAND CANYON NATIONAL PARK
Colorado R.
ARIZONA
SHIVWITS ES AREA
0 1 2 3 4 5
Scale in Miles
PROPOSED INTENSIVE WILDERNESS INVENTORY UNITS
LEGEND
I-123
UNITS (PRE-PUBLIC COMMENT)
ISA-1
INSTANT STUDY AREA
SPI-4
SPECIAL PROJECT UNIT (INTERMOUNTAIN POWER PROJECT)
UNITS NOT POSSESSING WILDERNESS CHARACTER (PRE-PUBLIC COMMENT)
MAP 2-9



MAP 2-10
NORTH RIM SOCIAL—ECONOMIC PROFILE AREA

TABLE 2-24

SOCIOECONOMIC CHARACTERISTICS FOR NORTH RIM SEPA AND COMPARISON AREAS

Socioeconomic Characteristics	Mohave North CCD	Kaibab CCD	Total Arizona Strip	Kane County	Washington County	Total SEPA	State of Arizona	State of Utah
Total Population 1970	926	1,409	2,335	2,421	13,669	18,425	1,770,900	1,059,300
Percent Change 1960-70	121	19		-9	33	27	36	19
Projected Population 1980	1,100	1,700	2,800	3,000	16,800	22,700	2,230,000	1,160,000
Projected Population 1990	1,400	2,100	3,500	3,600	20,400	27,500	2,700,000	1,310,000
Density Population/sq. mi.	0.18	0.47	0.28	0.62	5.63	1.64	15.61	12.90
Median Family Income	$5,615	$8,788		$7,935	$6,948	$7,132	$9,241	$9,320
Per Capita Income	$1,203	$1,744		$2,387	$2,102	$2,067	$2,945	$2,703
Unemployment Rate 1970			8.6	9.0	5.4	6.2	4.0	4.7
% Distribution by Race								
White 1/	91.0	79.0	83.8	99.8	98.4	96.6	90.6	97.4
Indian	9.0	21.0	16.2	.2	1.2	3.1	5.4	1.1
Other	-0-	-0-	-0-	-0-	0.3	0.3	3.9	1.5

Source: North Rim SEP, Arizona State Office BLM 1977

1/ Percentages may not add to 100 due to rounding.

The SEPA's population density amounts to 1.65 persons per square mile. The State of Arizona has a density of 15.61 persons per square mile, and Utah has a density of 12.9 persons per square mile. Washington County has a density of 5.63 persons per square mile, the highest in the SEPA.

The U.S. Bureau of the Census classified the Arizona Strip and Kane County as being entirely rural, whereas it classified Washington County as being equally rural and urban.

EMPLOYMENT-UNEMPLOYMENT

In 1970 over 23 percent of the workers in the SEPA were employed in the retail trade industry—a greater percentage than the 18 percent for Arizona or the 17 percent for Utah. This relatively high percentage reflects to some extent the dependence of the SEPA's economy on outdoor recreation, general tourism, and local retirement. The basic resource-using industries of agriculture and forestry employed about 8 percent of the SEPA's workers. A total of 465 persons were employed in some form of agriculture in the SEPA in 1970. The Grand Wash Planning Area Analysis (PAA), another BLM planning document, estimated that about 335 persons are dependent on income and employment generated from livestock operations tied to BLM allotments in the EIS area. Of this number, about 87 percent reside in the SEPA.

INCOME

For the SEPA as a whole, the government sector in 1970 provided the largest source of earnings (27 percent). The next most important source of earnings was wholesale and retail trade, providing 21 percent of the area's income. The service and contract construction industries were also important sources of income to the area's earnings. Agricultural employment provided only 6 percent of the area's earnings (BLM, 1977).

The Shivwits EIS area produced an average annual 83,940 AUMs on public lands during the past 5 years. The BLM Socioeconomic Data Systems (SEDS) estimated that each AUM produced contributed $5.34 of direct income (1977 dollars) to the SEPA's economy, amounting to 1 percent of the SEPA's total earnings in 1977, $64,281,000. The estimated livestock multiplier for the area is 1.6 (BLM, 1977). The 83,940 AUMs produced on Federal lands in the Shivwits EIS area would produce $48,240 of direct income or $717,183 of direct and indirect income.

An annual average of 92,242 AUMs was produced on Federal, State and private lands in the EIS area during the past 5 years. The direct income effect was $492,572, and the total income effect was $788,116. The total income effect, however, is not a significant amount when compared to the SEPA earnings estimate for 1977. The earnings produced by these AUMs are significant, however, when compared to the SEPA's total livestock earnings, $3,705,300, since they constitute 21 percent of the SEPA's livestock earnings.

Government Revenues

Ranch properties in the EIS area generate less than 0.1 percent of the total revenues for Mohave County, Arizona.

BLM revenues from grazing permits in the EIS area are based on the Federal AUMs permitted for each allotment. At the current rate of $1.89 per AUM and with 83,940 Federal AUMs, the average total annual fees collected by BLM for grazing in the EIS area (based on collections during the past 5 years) amount to $158,647.

The Federal Land Policy and Management Act of 1976 revised the allocation of grazing fee revenues. At least 25 percent of BLM's grazing fees are returned to the area where the fees are collected to be used for range rehabilitation, protection, and improvement. Another 25 percent of the fees can be directed by the Secretary of the Interior to be returned for range rehabilitation, but the Secretary may direct these funds to any of BLM's range lands. The State of Arizona receives 12.5 percent of the fees collected, returning them to Mohave County, which uses them for range improvements. On the basis of these guidelines, the EIS area would receive at least $59,500 for range improvements each year.

LIVESTOCK GRAZING OPERATIONS

Ranch Economics

On the average, 93 percent of the operations in the EIS area do not stock up to allowable AUMS (full active privileges). The allowable AUMs on Federal, private, and State lands for the area amount to 119,493 AUMs, but annual licensed AUMs averaged 92,242 over the past 15 years. The reasons for the operators' lower use are unknown. An allotment's range might be too poor to permit use of the fully allotted amount, or livestock prices below the costs required to maintain a herd might force ranchers to reduce herd sizes.

To gather economic information on typical ranch operations in the EIS area, the 60 operations in the EIS area were divided into four groups as follows:

Group 1	75 AUs or less	26 operations
Group 2	76 to 150 AUs	17 operations
Group 3	151 to 300 AUs	8 operations
Group 4	301 AUs and greater	9 operations

BLM and representative ranchers then developed a representative ranch budget for each ranch group. Although the terms representative and typical are used, the EIS area has no typical or representative ranches. Each ranch in the area has unique characteristics. Ranchers were placed in categories because lack of data precluded an individual analysis of each ranch. The budgets were developed at four separate meetings at which ranchers agreed on numbers used to compile ranch income statements for each ranch size. The representative income sizes were as follows:

Group 1	70 AUs
Group 2	116 AUs
Group 3	224 AUs
Group 4	651 AUs

The representative ranch income statements were then sent to all operators in the EIS area for comment, and the comments received were used to revise the statements. The four income statements are presented in table 2-25. Table 2-25 also includes an estimate of the average ranch capital per ranch size, which ranges from $1,100 to $1,800 per AU.

All four ranch sizes have a positive net ranch cash income (the amount of cash available to purchase new machinery and improvements, provide for living expenses of the ranch family, and to retire any outstanding debts against land, improvements, livestock, and machinery). Only for Group 4 operators, which receive the largest cash income, however, does net ranch cash income exceed non-cash expenses: owner-operator labor and depreciation. The small rate of return for representatve operations helps explain why operators are primarily concerned with covering operating cash costs rather than receiving a return on their investment.

SOCIAL ATTITUDES AND VALUES

Many individuals feel they would be impacted by the proposed action and are highly interested in it. These individuals can probably be best described as two distinct groups. One group consists of local ranchers. This group highly values independence, self-reliance, and hard work. These ranchers distrust outsiders and outside activity, especially government. The second group consists of diverse individuals, differing substantially in background, values, and outlook. These individuals are essentially urban residents who may or may not live in the SEPA but who have an interest in seeing the public lands used for nontraditional uses.

This discussion of social attitudes and values of ranch groups is based on information gathered from three sources:

- Discussions at four BLM meetings with 14 operators to gather representative ranch operation data (operators were asked to express opinions on how they perceived others would feel);
- Interviews with 12 operators who would be impacted by the proposed action and who attended the Grand Wash MFP open house; and
- Social data found in the Grand Wash Planning Area Analysis.

Operators in the EIS area perceive ranching as a way of life that provides

- freedom from supervision,
- an opportunity to work outdoors,
- an opportunity to be self-sufficient, and
- a place for children to have meaningful work and responsibility.

Generally operators prefer ranching as a way of life despite small earnings and despite the need (for many) for outside work to help keep their operations. Many operators' main concern is to cover operating cash costs and not the opportunity costs of their ranch investment.

Although ranchers feel that BLM provides some help in improving their ranch operations, some ranchers feel that new college graduates hired by BLM fail to communicate well and are unwilling to listen to people who have been on the ground a while and may have some ideas on how to operate a ranch.

Ranchers also express the concern that BLM employees transfer too often, creating a lack of continuity among personnel in the District office. Some operators feel that new employees often use different approaches in dealing with operators and that this change in direction causes a loss of time and money.

TABLE 2-25
INCOME STATEMENTS FOR FOUR REPRESENTATIVE RANCH SIZES
Arizona Strip District
Calendar Year 1978

	Group 1 70 AU Ranch	Group 2 116 AU Ranch	Group 3 224 AU Ranch	Group 4— 651 AU Ranch
Returns[a]	$ 9,313	$ 14,798	$ 32,384	$ 88,801
Cash Expenses[b]				
Fixed	2,238	3,124	11,460	12,600
Variable	6,487	7,871	20,505	44,515
Total Cash Expenses	8,725	10,995	31,965	57,115
Net Ranch Cash Income (returns minus cash expenses)	588	3,803	419	31,686
Less Non-cash Expenses[c]	(4,880)	(10,090)	(13,160)	(23,255)
Net Ranch Income	(4,292)	(6,287)	(12,741)	8,431
Average Ranch Capital[d]	$80,000	$179,900	$400,000	$1,100,000

[a] Returns include sales of calves, cull cows, bulls and yearlings.

[b] The fixed cash expenses include repairs, taxes, insurance and interest on fixed investment. The variable cash expenses include the other ranch expenses items like grazing fees, seed and fertilizer.

[c] Non-cash expenses include depreciation and owner-operator labor.

[d] Amount of money invested in land, improvements, and machinery.

The Federal Land Policy and Management Act of 1976 (FLPMA) clearly states that BLM will manage the public lands rather than dispose of them and establishes a policy of planning for multiple uses of the public lands. BLM's management of the public lands conflicts with the ranchers' value of independence. Many ranchers see multiple-use management as a threat to their lifestyles.

BLM's planning system is designed to insure that all group needs are heard. The manager has to mediate competing uses of the public lands.

Many of the members of the new urban groups that are interested in how lands like the Shivwits EIS area are managed live outside the SEPA and belong to national conservation groups representing their views. The urban group is often interested in wildlife and recreation—uses of the land that may conflict with such traditional land uses as livestock grazing.

CHAPTER 3

ENVIRONMENTAL CONSEQUENCES

CHAPTER 3

ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

Chapter 3 describes and analyzes the probable environmental impacts of the proposed action and alternatives. The analysis is designed to be commensurate with the expected magnitude, intensity, duration, and incidence of impacts. The discussion gives special attention to environmental components protected by law and other resources considered to be of particular importance to man and his environment.

Chapter 3 analyzes each impact and identifies and traces secondary impacts as far as practical. It analyzes temporary or short-term as well as permanent or long-term impacts. Short term is defined as 8 years or less (8 years being the period of implementation), and long term refers to at least an additional 15 years after complete implementation (2004).

BLM specialists used the following criteria to determine the nature of impacts identified:

Beneficial impact: Beneficial and positive resource conditions would improve over existing conditions, or adverse resource conditions would improve and reverse any downward trends.

Adverse impact: Beneficial and positive resource conditions would deteriorate, or resource conditions would not be expected to improve sufficiently to reverse an existing downward trend (or to improve a static adverse condition).

No impact: Resource conditions are not expected to be beneficially or adversely affected, or beneficial and positive resource conditions would remain static.

The following assumptions have been made as a basis for the impact analysis.

- The proposed action or the alternatives selected would be fully implemented as described.
- Construction stipulations would be effectively carried out and disturbance limited to that identified in the proposal or alternative calling for construction.
- The principal resource directly impacted is vegetation. Any changes in production, condition, trend, and potential of vegetation would affect other resources. Future forage allocations would consider land use plans, needs of other resources, and allocations in approximately the same proportion as shown in table 1-3.
- Socioeconomic analysis was conducted with the assumption that livestock market conditions would remain constant.
- BLM will have the manpower and funds to implement the proposal or any alternative.
- Monitoring studies will be completed as indicated and adjustments made as needed. Grazing systems will be followed, and no more than 60 percent of the current year's growth of forage will be consumed in the designated use pastures.
- Annual utilization of key forage *will not* exceed an average of 50 percent under the proposed action, alternative 2 (stocking by condition class), and alternative 3 (no vegetation manipulation).
- Annual utilization of key forage *will exceed* an average of 50 percent under alternative 1 (full stocking with management — 75 percent utilization under rest-rotation systems) and alternative 4 (no action — 67 percent average utilization).
- Average utilization of ephemeral vegetation will not exceed 50 percent under the proposed action and alternatives 2 and 3 but will exceed 50 percent under alternatives 1 and 4.
- The condition of the 105,338 acres in allotments under less intensive management is expected to remain static under the proposed action. Conditions would improve slightly under alternative 2 (stocking level by condition class) and moderately under alternative 5 (elimination of grazing on Federal lands).

The proposed action is predicted to have no significant impacts on geology, topography, climate, and air quality.

Chapter 3 will also discuss any mitigating measures to reduce or eliminate any adverse environmental impacts and will identify adverse impacts that could not be avoided should the proposed action be implemented.

In addition, chapter 3 discusses the relationship between the short-term use of man's environment and the maintenance and enhancement of the long-term productivity and identifies any irreversible or irretrievable commitments of resources involved in implementing the proposed action or its alternatives.

VEGETATION

SUMMARY

Overall the proposed action would benefit vegetation in the EIS area. Key species composition, overall, would increase from 14 to 17 percent, and range condition would improve. Acres in good condition would increase from 263,802 to 439,646 acres. With land treatment, 568,156 acres would be in good condition. Fair condition acres would decrease from 538,745 to 414,565. Poor condition acres would decrease from 1,046,348 to 994,684. With land treatment, poor condition acreage would drop to 866,174.

Overall average annual production would increase from 55 to 61 air dry pounds per acre. Average annual forage production on the 128,510 acres proposed for land treatment would increase from 50 to 94 pounds per acre, increasing overall EIS area production to 100 million pounds (125,953 AUMs) of usable forage.

Alternative 1 (full stocking) would allow small changes, but average key species composition would increase too little to raise it above 14 percent. Areas in good condition would increase to 309,846 acres, fair to 488,630 acres, and poor to 1,050,414 acres. Land treatment on 128,510 acres would reduce poor condition acreage to 921,904 and increase good condition acreage to 438,356. Key species composition in the treated area would increase to 60 percent, and annual production would increase from 50 to 94 air dry pounds per acre. Annual production on the rest of the EIS area would increase from 55 to 57 air dry pounds per acre. Total EIS area production would increase to 96 million air dry pounds or 120,755 AUMs.

Alternative 2 would allow the greatest improvements. Key species composition would increase from 14 to 18 percent. Range condition acreage would change as follows: good from 263,802 to 442,336 acres, fair from 538,745 to 414,576 acres, and poor from 1,046,348 to 991,983 acres. Land treatment on the 128,510 acres would increase good condition acreage to 570,846, fair condition acreage to 414,576, and poor condition acreage to 863,473. Average annual production would increase from 55 to 68 air dry pounds per acre. Total EIS area forage production would increase to 107 million pounds or 134,014 AUMs.

Alternative 3 would allow key species composition to increase from 14 to 17 percent. Condition of acreage would change as follows: good from 263,802 to 439,646 acres, fair from 538,745 to 351,391 acres, and poor from 1,046,348 to 1,057,858 acres. Annual production per acre would increase from 55 to 61 air dry pounds, increasing forage production to 92 million pounds or 115,202 AUMs.

Alternative 4 (no action) would allow no change from current composition, condition, and production, except the normal variability caused by weather.

Alternative 5 would change key species composition from 14 to 16 percent. Condition of acreage would change as follows: good from 263,802 to 439,646 acres, fair from 538,745 to 414,565 acres, and poor from 1,046,348 to 994,684 acres. After 15 years, vegetation stagnation from the accumulation of old growth would reduce forage production from 55 to 53 air dry pounds per acre. Annual production overall would decrease by 1.6 million air dry pounds to 103,054 AUMs.

The proposed action and alternatives 2, 3, and 5 would improve most vegetation subtypes by one condition class. The following subtypes when in poor condition, however, would not improve: sagebrush, pinyon-juniper, desert shrub, creosotebush, blackbrush, mountain shrub, conifer, and shadscale. In addition, pinyon-juniper, blackbrush, and conifer would not improve under fair condition. The condition of 128,510 acres of sagebrush, pinyon-juniper, and blackbrush under land treatment would change to good.

The desert shrub, creosotebush, and blackbrush types would change little from current conditions since they occur in an arid region, which affords little change in the perennial plant component. Annual plants, however, change dramatically with rainfall.

The conifer, pinyon-juniper, and sagebrush subtypes all occur in a rainfall zone that would allow much change if the canopy dominance of these types remains open. These species, however, are generally the climax species for these areas, and once they are dominant and increasing, grazing management would do little more than slow their invasion or reinvasion.

Alternative 1 (full stocking) would provide no opportunity for condition class changes except on allotments under deferred rotation grazing and on land treatments. Alternative 4 (no action) would allow little condition class changes.

Table 3-1 summarizes the impacts of the proposed action and alternatives on the condition, key species composition, and usable production of the vegetation subtypes.

Appendixes 3-1, 3-2, 3-5, and 3-8 present changes in range condition, usable forage production, and species composition by allotment and vegetation subtype.

ANALYSIS AND SUPPORTING DATA

The following analysis of study data gathered from 16 allotments under implemented AMPs provides the basis for projected changes in species composition, range condition, and usable forage production under the proposed action and alternatives 1, 2, and 3. (See appendixes 3-4 and 3.5.) Table 3-2 summarizes studies of implemented AMPs.

When key species composition shows an upward trend, one of two situations is occurring: (1) key species are increasing in number and area or (2) undesirable species are dying out while key species are remaining alive but static.

When the cover — live vegetation — shows an upward trend, all species are increasing in ground cover or area covered by live vegetation.

When cover shows a downward trend, the total area of ground covered by live vegetation (desirable or undesirable) is decreasing. Thus, when key species composition is up and cover is down, undesirable species may be dying out while the key species (desirable) are static or increasing. When key species composition is down and ground cover is up, the key species (desirables) are dying out while the undesirables (e.g., snakeweed) are remaining static or increasing in number and area.

When key species composition shows a static trend and ground cover an upward trend, the key species remain at the same level while all species are increasing in area. When both ground cover and key species are static, neither the amount of ground covered by vegetation nor species composition is changing. Table 3-2 shows a considerable down trend in key species composition.

The mostly downward trend on allotments in the EIS area can be explained by utilization, actual use, and weather studies. These studies indicate that key species trend goes down when average utilization frequently surpasses 55 percent or in a recent year utilization exceeds 70 percent under conditions of naturally erratic rainfall and frequent drought.

Utilization has generally exceeded 55 percent on Black Rock, Little Tank, Sullivan Canyon, Mainstreet, Duncan Tank, Jackson Tank, and Poverty allotments. During the last 3 years, utilization has averaged below 50 percent on Little Tank allotment. These allotments all show static or down trends.

Black Rock allotment is similar to Lower Hurricane since its key areas have 100 percent key species, mostly browse. The browse is maintaining well under the heavy utilization, but cool-season grasses are trending downward, resulting in a static trend.

Pinyon-juniper reinvasion of land treatment areas where the pinyon-juniper is the climax species causes down trend regardless of management. Such reinvasion has caused the down or static trend on Whiterock-Soapstone and Mt. Trumbull allotments and has partially caused the static or down trend in Sullivan Canyon, Mainstreet, Poverty, Duncan Tank, and Clay Springs allotments. Land treatment, reapplied, can reverse this downward trend. Reapplication of land treatment should occur from 15 to 20 years after initial land treatments, but it can vary according to each area's needs.

Drought, which occurs frequently in this region, also causes a downward trend, regardless of management. Drought appears to more acutely affect live vegetation ground cover than it does species composition.

Utilization on Clay Spring, Little Wolf, Lower Hurricane, Parashaunt, Toquer Tank, and Beaver Dam Slope allotments with very few exceptions has not exceeded 55 percent, and key species trends are up on all but Lower Hurricane, Beaver Dam Slope, and Clay Spring allotments.

Toquer Tank and Parashaunt allotments clearly show that moderate utilization (38 to 44 percent) can improve key species composition. Parashaunt's trend is somewhat frustrated by turbinella oak reinvasion on its seedings.

Lower Hurricane allotment has not had an upward trend because it has been in good condition since AMP implementation. Most of its key areas have maintained 80 to 100 percent key species composition, allowing for little or no improvement.

Beaver Dam Slope allotment lies in the Mohave Desert and shows a down trend in all its key grasses, an up trend in its browse, and a static trend overall. The spring grazing of these grasses in this arid area harms the range, since

TABLE 3-1
SUMMARY OF IMPACTS ON FORAGE PRODUCTION, RANGE CONDITION AND KEY SPECIES COMPOSITION
USABLE FORAGE PRODUCTION

Subtype	Acres	Percent of ES Area	Average Current Useable Production Per Acre	Proposed Action Average Usable Production per Acre	Full Stocking Prod/Acre	Stocking by Condition Class Prod/Acre	No Vegetation Manipulation Prod/Acre	No Action Prod/Acre	Elimination of Grazing Prod/Acre
Grassland	254,129	14	96	114	109	137	114	106	88
Sagebrush (treatment)*	163,914	9	63	70 (91)	64 (91)	77 (91)	70	65	59
Pinyon-juniper (treatment)	434,439	20	43	44 (123)	43 (123)	44 (123)	44	43	44
Desert shrub	515,872	29	39	46	40	49	46	41	44
Creosotebush	99,281	5	29	30	29	33	30	29	30
Blackbrush (treatment)	43,089	2	43	46 (68)	43 (68)	68 (68)	46	43	41
Mountain shrub	34,542	1	92	92	92	92	92	92	92
Conifer	5,938	1	72	72	72	72	72	72	72
Half-shrub/ Snakeweed	45,555	2	38	40	38	40	40	38	33
Annuals	41,682	2	29	67	31	67	67	41	51
Saltbush	165	1	102	118	102	135	118	102	91
Shadscale	1,535	1	34	34	34	34	34	34	34
Unsuitable	208,754	15	--	--	--	--	--	--	--
Total	1,848,894	100							

* The numbers in the parenthesis ( ) represent the number or quantity reached under the title by land treatment, which is not figured into the average or the total.

TABLE 3-1 (continued)
KEY SPECIES COMPOSITION
% COMPOSITION

Subtype	Current		Proposed Action		Full Stocking		Stocking by Condition Class		No Vegetation Manipulation		No Action		Elimination of Grazing	
	Grass	Shrub	Grass	Shrub	Grass	Shrub	Grass	Shrub	Grass	Shrub	Grass	Shrub	Grass	Shrub
Grassland	47	11	55	11	48	11	64	13	55	11	50	11	48	11
Sagebrush (treatment)	21	5	25 (47)	8 (13)	22 (47)	6 (13)	28 (47)	8 (13)	25	8	23	6	24	6
Pinyon-juniper	9	8	9	8	Same as current composition		9	8	9	8	9	8	9	8
(treatment)			(36)	(24)	(36)	(24)	(36)	(24)						
Desert shrub	9	12	11	16	Same as current composition		13	17	11	16	10	14	12	15
Creosotebush	4	14	6	17	"		6	17	6	17	3	16	6	17
Blackbrush (treatment)	2	13	4 (40)	13 (20)	" (40)	(20)	4 (40)	13 (20)	4	13	2	13	4	13
Mountain shrub	2	32	2	38	"		2	43	2	38	2	35	2	31
Conifer	6	13	7	13	"		7	13	7	13	6	13	7	13
Half-shrub	9	15	10	17	"		13	17	10	17	9	15	11	15
Annuals	7	6	15	10	9	9	25	13	17	13	10	7	14	9
Saltbush	25	38	30	43	Same as current composition		33	50	30	43	25	38	28	40
Shadscale	T	9	T	9	"		T	9	T	9	T	9	T	9
Unsuitable	--	--	--	--			--	--	--	--			--	--

TABLE 3-1 (continued)
RANGE CONDITIONS
Acres

Subtype	Current Good	Current Fair	Current Poor	Proposed Action Good	Proposed Action Fair	Proposed Action Poor	Full Stocking Good	Full Stocking Fair	Full Stocking Poor	Stocking by Condition Class Good	Stocking by Condition Class Fair	Stocking by Condition Class Poor	No Vegetation Manipulation Good	No Vegetation Manipulation Fair	No Vegetation Manipulation Poor	No Action Good	No Action Fair	No Action Poor	Elimination of Grazing Good	Elimination of Grazing Fair	Elimination of Grazing Poor
Grassland	212,455	12,884	28,790	229,456	22,395	2,278	217,009	7,640	29,480	229,456	23,395	2,278	229,456	22,395	2,278	217,014	8,327	28,790	Same as proposed action except no land treatment		
Sagebrush (treatment)	5,386	109,819	48,709	77,738 (25,100)	41,181	44,995	46,876 (25,100)	69,586	47,452	77,738 (25,100)	41,181	44,995	77,738	41,181	44,995	48,683	66,522	48,709			
Pinyon-juniper (treatment)	1,736	166,951	265,752	1,736 (85,760)	161,197	271,506	1,736 (85,760)	161,158	271,545	1,736 (85,760)	161,197	271,506	1,736	98,023	334,680	1,736	166,951	265,752			
Desert shrub	27,086	168,883	319,903	83,428	120,761	311,683	27,086	168,883	319,903	83,428	120,761	311,683	83,428	120,761	311,683	27,086	168,883	319,903			
Creosotebush	9,629	30,815	58,837	9,629	30,815	58,837	9,629	30,815	58,837	9,629	30,815	58,837	9,629	30,815	58,837	9,629	30,815	58,837			
Blackbrush (treatment)	--	703	42,386	-- (17,650)	1,761	41,328	-- (17,650)	703	42,386	-- (17,650)	1,761	41,328	--	1,761	41,328	--	703	42,386			
Mountain shrub	4,006	12,335	18,201	9,433	6,908	18,201	4,006	12,335	18,201	9,433	9,609	15,500	9,433	6,908	18,201	7,795	8,546	18,201			
Conifer	--	--	5,938	--	--	5,938	--	--	5,938	--	--	5,938	--	--	5,938	--	--	5,938			
Half-shrub	--	15,453	30,102	3,827	12,685	29,043	--	15,453	30,102	6,517	9,995	29,043	3,827	12,685	29,043	--	15,433	30,102			
Annuals	3,339	20,902	17,441	24,234	16,862	586	3,339	22,057	16,286	24,234	16,862	586	24,234	16,862	586	3,339	20,902	17,441			
Saltbush	165	--	--	165	--	--	165	--	--	165	--	--	165	--	--	165	--	--			
Shadscale	--	--	1,535	--	--	1,535	--	--	1,535	--	--	1,535	--	--	1,535	--	--	1,535			
Unsuitable	--	--	208,754	--	--	208,754	--	--	208,754	--	--	208,754	--	--	208,754			208,754			
Total	263,802	538,745	1,046,348	439,646 (+128,510)	414,565	994,684 (-128,510)	309,846 (+128,510)	488,630	1,050,418 (-128,510)	442,336 (+128,510)	414,576	991,983 (-128,510)	439,646	414,565	994,684	315,448	487,102	1,046,348			
Total with land treatment				568,156	414,565	866,174	438,356	488,630	921,908	570,846	414,576	863,473									

TABLE 3-2
AMP STUDIES SUMMARY - SHIVWITS RESOURCE AREA

AMP	Utilization		Actual Use		Trend*		Average Percent** and Range	Overall Trend
	Years above 55%	Years below 55%	Years above Carrying Cap.	Years below Carrying Cap.	Key Species Composition	Vegetation Live Cover	Increase or Decrease of Key Species	Overall Trend Index**
Black Rock	4 (58-77)	2 (45-55)	1	6	Static	Up	+2 (0 to 12)	100 to 135
Little Tank	5 (64-80)	3 (45-49)	1	6	Down	Static	-9 (0 to -20)	100 to 100
Sullivan Canyon	4 (56-72)	1 (48)	1	2	Down	Up	-17 (0 to -86)	100 to 94
Mainstreet	3 (58-60)	0	0	3	Static	Up	-3 (+43 to -63)	100 to 106
Duncan Tank	3 (56-75)	2 (27-31)	7	1	Down	Down	-23 (0 to -51)	100 to 75
Jackson Tank	4 (58-80)	3 (40-43)	1	5	Static	Down	-1 (0 to -2)	100 to 103
Poverty	2 (61-80)	2 (37-55)	1	2	Static	Down	-1 (-54 to 56)	100 to 102
Little Wolf	2 (58-84)	2 (23-50)	0	3	Up	Up	+59 (0 to +92)	100 to 3,773
Lower Hurricane	2 (72-73)	5 (31-53)	2	3	Staic	Up	-10 (+12 to -51)	100 to 97
Clay Spring	2 (60-80)	5 (22-50)	4	2	Static	Down	-10 (-41 to +16)	100 to 101
Whiterock-Soapstone	0	5 (37-53)	3	2	Static	Down	-10 (+35 to -67)	100 to 80
Parashaunt	0	3 (42-48)	0	4	Up	Down	-10 (+17 to -91)	100 to 93
Toquer Tank	0	5 (10-50)	0	4	Up	Down	+15 (0 to +39)	100 to 118
Mt. Trumbull	0	4 (30-49)	3	2	Down	Down	-7 (-29 to +4)	100 to 93
Beaver Dam Slope	0	6 (23-43)	1	3	Static	Up	-4 (0 to -23)	100 to 110

*Ranked as per the majority of plots: Up, down, static.

**Plots percentage increase or decrease are combined, and averaged.

***Reflects trend of key species, live vegetation cover, seedlings and dead plant litter accumulation in total.

undependable rains cannot assure restoring vigor to grasses before the next grazing season. Rainfall acutely affects trend in this zone, but even during wet winters cool-season grasses are trending down over the years (dry and wet).

Clay Springs allotment has a static trend, partially due to pinyon-juniper reinvasion. Like Lower Hurricane, Clay Springs has had a good condition composition of key species since AMP implementation.

These studies reveal that for a trend in key species to improve, utilization during all seasons, not just the growing seasons of various species, must be no greater than 50 percent. Heavy use during the dormant season appears to be just as harmful as heavy use during the growing season.

In addition, a wide spectrum of species (warm-season, cool-season, and browse) and their widely different phenological stages (see table 2-4) make holding utilization levels to around 50 percent paramount, since cool-season plants may be dormant when warm-season plants have just begun to grow. Warm-season plants, for example, may not get enough moisture to grow until the late summer rains have occurred and cool-season grasses have become dormant. Heavy use of the cool-season species during late summer results in heavy use of the newly growing succulent warm-season species. Similarly, heavy grazing in the late winter and spring harms succulent cool-season plants.

Browse presents a special problem because it requires 2 years to produce seed. Variable rains and phenological stages require utilization on browse to be held to around 50 percent at all times.

Percent increase, however, would vary in each allotment. Key species composition on some allotments would increase by only 5 or 10 percent due to site-specific conditions. A small change of 1 to 5 percent in key species could result from a range being in good condition, consisting of 90 percent key species, and having little room or likelihood for change. Little or no change in key species composition could be expected on ranges in poor condition and ranges occupied by unpalatable brush with no understory of palatable species. No change would result because all plant space is occupied by unpalatable species.

When the average utilization of a grazing cycle rises above 55 percent or when utilization in one year reaches 70 percent, the trend of key species declines. If, however, heavy utilization has occurred more than 5 years before the most recent trend reading, the more recent years of lower utilization negate the effect of heavy use as illustrated by the Lower Hurricane, Jackson Tank, and Clay Spring allotments.

The grazing systems are designed to allow for different periods of use and rest, allowing cool- and warm-season grasses and browse to build vigor and achieve seed ripe. Winter-spring use reduces the vigor of warm-season grasses during the growing state, allowing an increase in grass and browse vigor and seed ripe. Summer and fall use, in turn, allows cool-season grasses and browse to increase their vigor and to achieve seed ripe.

Projected impacts of the stocking by condition class alternative were based on a study by Gibbens and Fisser (1975), which reported considerable improvement on BLM allotments in Wyoming under grazing systems and an average 30 percent utilization. The area involved has 8 to 12 inches of rainfall annually but has a temperature regime much lower than that of the Arizona Strip. This study found utilization over a 5-year period to average 36 percent on the perennial grasses and 26 percent on perennial grasses and browse combined. The average percent increase for key grass species was 34 percent, for key forage species 23 percent, and for key shrub species 1 percent.

Continuing the Wyoming study to 1977, Gerhart and Fisser (1977) concluded that existing stocking rates and low utilization had not placed enough stress on the plant community to allow detection of differences between grazing systems, since all treatment had improved range conditions. The systems included four-pasture rest rotation, two-pasture deferred rotation, and one-pasture continuous grazing by cattle from spring to fall.

To determine the effect of continuing current management — the no-action alternative — the vegetation subtypes were projected to remain as they are today except on the 16 allotments with implemented AMPs. These AMPs would improve subtypes within the allotments or be revised according to vegetation monitoring studies to improve the subtypes vulnerable to change. The subtypes on non-AMP allotments over the next 15 years would remain much as they are today, since current grazing management would not allow or provide stimulus for change. Natural succession would continue according to existing environmental factors.

The static trend expected under alternative 1 is demonstrated in Buffalo Tank allotment in the Vermillion Resource Area, which has trend plots demonstrating the effect of nonrotation grazing under moderate-high utilization. Buffalo Tank's trend plots show a static to slight decrease in key species composition. The 1976-1977 drought and moderate-high utilization (57 percent), however, have drastically reduced ground cover, causing the overall down trend (BLM, 1979).

To determine the effect of eliminating grazing on vegetation, BLM specialists used line intercept transects to analyze vegetation within and outside three, 1-acre exclosures, established in 1951 in desert grassland and saltbush vegetation subtypes in the Clayhole allotment of the Arizona Strip's Vermillion Resource Area.

Specialists read the transects in the north and south exclosures in 1951, 1952 and 1953 and again 25 years later in 1978. The middle exclosure was read in 1951, 1952, 1953, 1960, and 1978. Since the middle exclosure has had more frequent readings and readings somewhat closer to the EIS time frame of 15 years, it was used to project the species composition and range condition under elimination of grazing. Although this exclosure has serious limitations for projections of species composition, it provides a shred of evidence in an otherwise large void.

The interior transect of the middle exclosure revealed a fivefold vegetation density increase from 1951 to 1960 but a 50 percent density decrease from 1960 to 1978. In 1951 species composition included 33 percent galleta, 17 percent alkali sacaton, and 50 percent fourwing saltbush. In 1960 the species composition included 90 percent galleta, 3 percent alkali sacaton, and 7 percent snakeweed. By 1978 the species composition was 69 percent galleta, 19 percent alkali sacaton, 6 percent squirreltail, and 6 percent cactus. The main shift was the loss of saltbush from the transect. The overall reduction in key species amounted to 6 or 7 percent (BLM, 1979).

In addition, by 1978 density decreased from the last readings 25 years before by 39 percent in the north and by 60 percent in the south exclosures. Key species composition decreased in both.

The middle exclosure demonstrated what the production studies discussed later in this section also demonstrated: after an area is excluded from livestock grazing, its species composition and condition on subtypes subject to improvement improve within the first decade but stagnate and degrade to varying degrees during the years thereafter.

For analysis of the impact of elimination of grazing, specialists applied the above 6 percent reduction in key species to subtypes subject to change after reaching the 10-year improved level — the proposed action's level of key species and condition. These results were combined with projections for other subtypes to determine the overall change. In the grassland subtype key grass species composition would increase to 48 percent, and key shrub species would increase to 11 percent. The condition of acreage would remain the same as that projected for the proposed action. These exclosures also appear to have a much denser vegetation cover and heavier litter load than surrounding areas due to a lack of grazing.

The following studies support the projection that forage production after elimination of grazing would trend up for about 10 years and then degrade or stabilize. The 1972 San Luis (New Mexico) Watershed Study (BLM, 1978c) demonstrated how forage production increased during the first 10 years after the elimination of grazing from an area. In fact, major perennial grasses increased from 424 pounds per acre in 1964 to 431 pounds per acre in 1971 in a nongrazing area. Studies by Michaels and others (1967), Jameson, Williams, and Wilton (1962), and Thatcher and Hart (1974) all demonstrated on areas near and within the Arizona Strip District that sandy gravelly loam surface soils support good key species composition in the absence of livestock grazing. On the other hand, platy and vesicular surface soils (poor soil conditions) do not support significant quantities of key species, even without grazing.

Other studies, however, reveal how production decreases under longer time frames. Texas Tech University (1976) compared Rio Puerco grazing allotments to sites ungrazed since 1909 in Chaco Canyon National Monument (all in New Mexico) for the effect of grazing and nongrazing on production. Investigators found that long-term nongrazing reduced the weighted average total vegetation ground cover by 22 percent. They also found that litter remained unchanged and bare ground increased by 15 percent on the ungrazed sites.

Finally, Reardon and Merrill (1976) found that, in Texas, forage yields and litter accumulations were lower on ungrazed areas than on areas having undergone deferred rotation grazing and light grazing over a 20-year period. After 20 years the ungrazed exclosure produced 19 percent less forage than the area under deferred rotation grazing. This research suggests that plants that decrease with the elimination of grazing require some form of grazing to retain their vigor and productivity.

BLM specialists reduced the proposed action's expected increase in AUMs of usable forage in the subject subtypes by 22 percent — the percentage of decline in production determined by the San Luis Watershed Study (BLM, 1978c). They then applied this reduction to subtypes subject to change from the elimination of grazing.

METHODOLOGY SUMMARY

Specialists applied the following analysis and thought process to all vegetation subtypes in the EIS area to demonstrate how the subtypes would improve. A grazing system (deferred rotation or rest rotation) or moderate season-long use is applied to an allotment with vegetation subtypes that this action would change. For example, a grassland type in that allotment has 35 percent key species composition. A grazing system with an average utilization of 50 percent is implemented. After 15 years key species have increased on the average by 15 percent, placing the key species at 50 percent and shifting the condition class from fair to good. (Forty percent key species in a subtype places a subtype in good condition.)

Resource specialists in the field estimated future usable production per acre of the grassland, sagebrush, pinyon-juniper, saltbush, and desert shrub subtypes. They made such estimates on the basis of the current production of those existing types under good, fair, and poor conditions. (See appendix 1-1 for the methodology used.) They then extrapolated these estimates to those acres predicted to change or remain static. The other subtypes did not occur frequently enough in all three conditions to permit extrapolation of reliable data. (See table 3-3 for the production per subtype per condition class.) Subtypes that improve from a low fair to high fair and a low good to a higher good condition would also increase production. Thus a fair condition grassland producing 85 pounds per acre when improved to a good condition class would increase to 98 pounds per acre: 85 × .15 = 13; thus 85 + 13 = 98 pounds per acre.

The low-fair to high-fair condition change would increase production by the same percent as from poor to fair for each subtype, whereas low-good to high-good would increase production by the same percent increase as from fair to good.

Under the proposed action and alternatives 2, 3, 4, and 5, rest-rotation and deferred rotation grazing would increase usable forage production with the change to a better range condition class. Usable vegetation production increases as a subtype's condition improves from poor to fair or from fair to good. Alternative 1 (full stocking) would improve production on acres undergoing land treatment and on allotments under deferred rotation grazing. Alternative 5 (elimination of grazing) would allow a slight increase from current production.

KEY SPECIES COMPOSITION, RANGE CONDITION, AND PROJECTED USABLE FORAGE PRODUCTION

Grassland Subtype

The proposed action's grazing systems and alternatives 2 and 3 would increase key grass species composition in the grassland subtype from 47 to 55 percent. Key shrub species composition would remain at 11 percent, since the grassland subtype is ecologically more favorable to desert grasses than to shrubs.

This average increase in key species composition would move more acres from fair to good condition. The area in good condition would increase from 212,455 to 229,456 acres; the area in fair condition would increase from 12,884 to 22,395 acres; and 2,278 acres would remain in poor condition. The Toquer Tank allotment, with a 15 percent key species increase in 9 years, demonstrated that grassland subtypes with room for improvement respond well to grazing systems.

Under the full stocking alternative (alternative 1) grasslands would remain in their current condition. Utilization would be too high to allow improvement, as demonstrated by Little Tank allotment, with more than 60 percent utilization from 1969 to 1975. Grasslands under deferred rotation systems under alternative 1, however, would improve, since utilization would be the same as under the proposed action. Deferred systems would be at full stocking since all pastures would be used in 1 year.

Grasslands under the full stocking alternative would change little in 15 years. Key species composition would increase from 58 to 59 percent. Range condition would change as follows: good condition acres would increase from 212,455 to 217,009; fair condition acres would decrease from 12,884 to 7,640; and poor condition acres would increase from 28,790 to

TABLE 3-3
AVERAGE PRESENT USABLE PRODUCTION BY RANGE CONDITION AND VEGETATION SUBTYPE

	Air Dry Pounds Per Acre				
Subtype	Good	% Change*	Fair	% Change*	Poor
Grassland	99	15	85	19	69
Sagebrush	82+	21	65+	43	37+
Pinyon-juniper	84+	48	44	19	36
Saltbush	87+	25	65+	35	42+
Desert Shrub	92	50	46	27	37
Creosotebush	-	-	36	37	23
Half Shrub	-	-	53	51	26
Annuals	-	-	62	59	26

The remaining subtypes have insufficient data to calculate a reliable average or production per condition.

Where no data exist for extrapolation of production figures, current production will be used in projection.

Source: Production data from survey writeup sheets. All production data were arrayed and averaged for each subtype under each range condition.

*Good to Fair and Fair to Good
**Poor to Fair and Fair to Poor
+Air dry pounds per acre from Vermillion Grazing Draft ES (BLM, 1979)

29,480. Production would increase from 102 to 109 air dry pounds per acre.

Alternative 4 (no action) would allow no change from the current conditions and no decline in vegetation conditions, since no new range improvements would be constructed and no new areas would be opened to livestock grazing. Thus grazing pressure, species composition, range condition, and production would remain the same.

Alternative 5 (elimination of grazing) would allow key species composition to increase during the first 10 years. This increase would shift conditions up one class and increase production. After 10 years, however, the old growth and ungrazed forage would stagnate and variably degrade from the improved conditions.

As the result of the above changes in range condition, usable forage production in the grassland subtype would respond to intensive management as follows:

- The proposed action would increase per-acre production from 96 to 114 air dry pounds.
- Full stocking (alternative 1) would increase per-acre production from 96 to 109 air dry pounds.
- Stocking by condition class (alternative 2) would increase per-acre production from 96 to 137 air dry pounds.
- No vegetation manipulation (alternative 3), like the proposed action, would increase per-acre production from 96 to 114 air dry pounds.
- The no-action alternative (alternative 4) would increase per-acre production from 96 to 106 air dry pounds.
- Elimination of grazing (alternative 5) would decrease per-acre production from 96 to 88 air dry pounds as a result of stagnation from annually accumulating old growth.

Sagebrush Subtype

The proposed action would allow key grass species to increase from 21 to 25 percent and key shrub species to increase from 5 to 8 percent.

On the 25,100 acres of sagebrush plowed, key grass species would increase to 47 percent, and key browse species would increase to 13 percent (Little Wolf AMP Trend Studies and Whiterock-Soapstone Trend Studies).

Varying amounts of target shrubs and trees would be killed. Plants seeded in the plowed area would respond to the lack of competition from other perennials and increase usable forage production several fold as allowed by site conditions.

The area in good condition in the sagebrush subtype would increase from 5,386 to 77,738 acres. With the land treatment, good condition acres would increase to 102,838. The area in fair condition would decrease from 109,819 to 41,181 acres, and the area in poor condition would decrease from 48,709 to 44,995 acres. The area in poor condition, however, would decline to 20,195 acres after land treatment.

Under alternative 1 (full stocking) key species composition would increase from 26 to 28 percent. Range condition would change as follows: good condition areas would increase from 5,386 to 46,876 acres; fair condition areas would decrease from 109,819 to 69,586 acres, and poor condition areas would decrease from 48,709 to 47,452 acres. On allotments undergoing land treatment, areas in good condition would increase to 71, 976, and areas in poor condition would decrease to 22,352 acres. These changes would result from deferred rotation grazing systems and land treatment.

Utilization of 30 percent and rest-rotation grazing under alternative 2 (stocking by condition class) would allow key grass species in the sagebrush subtype to improve from 21 to 28 percent and the key shrub species to improve from 5 to 8 percent. Improvements resulting from land treatment under alternative 2 would be the same as under the proposed action. The range condition acreage would also be the same as under the proposed action.

Alternative 3 (no vegetation manipulation) would have the same impacts as the proposed action, except for the acres that would not be treated.

Alternative 4 (no action) would leave the sagebrush subtype unchanged from the present.

Alternative 5 (elimination of grazing) would allow the key grass species to increase to 24 percent and key shrub species to increase to 6 percent. Condition acreage would remain that of the proposed action: 77,378 acres — good; 41,181 acres — fair; and 44,995 acres — poor.

The proposed action and its alternatives would affect the usable forage production in the sagebrush subtype as follows:

- Increase from 63 to 70 air dry pounds per acre under the proposed action and the no vegetation manipulation alternative.

- Increase from 63 to 64 air dry pounds per acre under the full stocking alternative.
- Increase from 63 to 67 air dry pounds per acre under the stocking by condition class alternative.
- Increase from 63 to 65 air dry pounds per acre under the no-action alternative. The increase would occur on allotments under implemented AMPs.
- Decrease from 63 to 59 air dry pounds per acre with the elimination of grazing on Federal lands.

A total 25,100 acres of sagebrush would be plowed and seeded under the proposed action, full stocking, and stocking by condition class, increasing air dry pounds per acre from 63 to 90 on the plowed acreage. Production would increase from 928,700 to 2.2 million pounds of forage or from 1,161 to 2,823 AUMs.

Pinyon-Juniper Subtype

The pinyon-juniper subtype would not change under the proposed action or its alternatives, since this acreage consists of a pinyon-juniper climax (Humphrey, 1955) whose species composition, production, and range condition could not change unless land treatment or fire breaks the canopy dominance of the trees. Moreover, grazing systems have been found to negligibly affect the pinyon-juniper subtype (Gibbens and Fisser, 1975).

Even in grazing exclosures, pinyon-juniper begins reestablishing at the same rate inside as outside exclosures in pinyon-juniper climax areas, as demonstrated in the Whiterock-Soapstone allotment, where land has been treated (Whiterock-Soapstone AMP Study Files Auxiliary).

A total of 85,760 acres of pinyon-juniper would be double chained under the proposed action and the full stocking and stocking by condition class alternatives. Double chaining would kill between 28 and 95 percent of the target trees, for an average kill of 60 percent. The percentage of kill depends on the age and height of trees, the older and taller trees being more susceptible to chaining (Vallentine, 1971).

Land treatment in the pinyon-juniper subtype would increase key species composition up to an average of 60 percent (Little Wolf AMP Trend Studies). Of the 265,752 acres in poor condition, 85,760 acres would improve to good condition. Production would increase from 36 to 136 air dry pounds per acre or from 3 to 11.6 million pounds of forage or from 3,859 to 14,579 AUMs.

Desert Shrub Subtype

In the desert shrub subtype the proposed action would increase key grass species from 9 to 11 percent and key shrub species from 12 to 16 percent. Acres in good condition would increase from 27,086 to 83,428; fair condition acres would decrease from 168,883 to 120,761; and poor condition acres would decrease from 319,903 to 311,683.

In most cases grazing systems would not change desert shrub types in poor condition. Acres that would change would move from a high poor condition to a low fair condition. Key species on these acres would increase from 1 to 5 percent.

The desert shrub subtype occupies an arid environment. Under these arid conditions, vegetation composition and condition change slowly. Under any action the potential for increasing the perennial grass component where shrubs dominate in this type is slight, as demonstrated in the Beaver Dam Slope allotment.

Alternative 1 (full stocking) would not change the desert shrub subtype from present condition and composition.

Alternative 2 (stocking by condition class) would improve the desert shrub subtype most by allowing key grass species to increase from 9 to 12 percent and key shrub species to increase from 13 to 17 percent. Range condition acreage would be the same as under the proposed action.

Alternative 3 (no vegetation manipulation) would have the same impacts as the proposed action.

Alternative 4 (no action) would not change current condition or composition.

Alternative 5 (elimination of grazing) would allow key grass species to increase from 9 to 12 percent and key shrub species to increase from 12 to 15 percent in the desert shrub subtype. Range condition would be the same as under the proposed action.

The proposed action and its alternatives would affect usable forage production in the desert shrub subtype as follows.

- Under the proposed action and no vegetation manipulation alternative usable forage production would move from 39 to 46 air dry pounds per acre.

- Under full stocking, usable forage production would increase from 39 to 40 air dry pounds per acre only on acres under deferred rotation.
- Low utilization under the stocking by condition class alternative would increase usable forage production from 39 to 49 pounds per acre.
- Elimination of grazing would increase usable forage production from 39 to 44 air dry pounds per acre. On this arid subtype stagnation of growth would not occur as quickly as on other subtypes, and production would also drop more slowly.
- Usable forage production on the 40,314 acres of desert shrub designated for ephemeral management would not change after 15 years.

Creosotebush Subtype

The proposed action and alternatives 2, 3, and 5 would increase key grass species composition from 4 to 6 percent and key shrub composition from 14 to 17 percent. This increase, however, would not be enough to change condition classes of this subtype's acreage. Range condition acreage would not change under the proposed action or any of the alternatives. Production under the proposed action and alternative 3, however, would increase from 29 to 30 air dry pounds.

Key species composition would change little if at all in the creosotebush subtype. This arid subtype is shrub dominated, allowing little change in perennial grasses. Moreover, this subtype's perennial grass component is weak because creosotebush leaf and root residues have a lethal effect on grasses, and historically the small perennial grass component has been overgrazed.

Alternative 1 (full stocking) would allow no change in production, species composition, or range condition. Alternative 2 (stocking by condition class) would increase production from 29 to 33 air dry pounds per acre. Production would not increase under alternative 4 (no action), and under alternative 5 (elimination of grazing) production would increase from 29 to 30 air dry pounds per acre.

Blackbrush Subtype

The blackbrush subtype is monotypic and arid and has few other species in association, leaving little room for vegetation composition change. Without fire and with or without livestock grazing, this subtype would change little over the long term.

The proposed action would increase key grass species composition in the blackbrush subtype from 2 to 4 percent but maintain key shrub species composition at 13 percent. The condition of acreage, however, would not change. Usable forage production per acre would increase from 43 to 46 air dry pounds per acre.

Under alternative 1 (full stocking) current condition, composition, and production would not change. Alternative 2 (stocking by condition class) would increase key species composition to the percentage expected under the proposed action. No change in condition would occur. Under alternative 3 (no vegetation manipulation) acres not undergoing land treatment would have the same key species composition expected under the proposed action. Alternative 4 (no action) would allow no changes from current condition, composition, and production.

Under the proposed action and alternatives 1 and 2, the burning of blackbrush (17,650 acres) would increase key species composition to 60 percent, move range condition to good, and increase usable production to 99 pounds per acre.

Burning of blackbrush could kill up to 100 percent of the target species in the area, removing completelv the blackbrush canopy (Bowns and West, 1976).

Mountain Shrub Subtype

Under the proposed action and alternative 3 key grass species would remain at 2 percent. Key shrub species, however, being dominant in the subtype, would increase from 32 to 38 percent. Good condition acres would increase from 4,006 to 9,433; fair condition acres would decrease from 12,335 to 6,908; and poor condition acres would remain at 18,201. Alternative 1 would allow no change from current condition, composition, and production. Under alternative 2 key shrub species would increase to 43 percent; key grass species would not change; and range condition would remain the same as under the proposed action. Under alternative 4 no change would occur from the present. Under alternative 5 key shrub species would decrease from 32 to 31 percent, and condition would remain the same as at present.

Production for proposed action and alternatives would remain at 92 air dry pounds of forage per acre.

Conifer Subtype

This subtype, like the pinyon-juniper subtype, would remain unchanged by the proposed action and alternatives, but no land treatment would be applied.

Half-Shrub Subtype

In the half-shrub subtype the proposed action and alternative 3 would allow the key grass species to increase from 9 to 10 percent and key shrub species to increase from 15 to 17 percent. Acreage in good condition would increase from 0 to 3,827; acreage in fair condition would decrease from 15,453 to 12,685, and acreage in poor condition would decrease from 30,102 to 29,043. Grazing systems on the half-shrub subtype, like on the desert shrub and creosotebush, are not as effective as on other subtypes because of aridity and because snakeweed dominates, preventing the increase of key species.

Under alternative 1 (full stocking) the subtype would not change from the current situation.

Alternative 2 would allow key grass species to increase from 9 to 13 percent and key shrub species to increase from 15 to 17 percent. Range condition acreage would improve to that expected under the proposed action.

Alternative 4 would allow no change from the current situation.

Under alternative 5 key grass species would increase from 9 to 11 percent while key shrub species would remain at 15 percent. Condition would be the same as that under proposed action.

Usable forage production in the half-shrub subtype would

- increase from 38 to 40 air dry pounds per acre under the proposed action and no vegetation manipulation;
- remain at 38 air dry pounds per acre under full stocking and no action;
- increase to 40 air dry pounds per acre under stocking by condition class; and
- decrease to 33 air dry pounds per acre under elimination of grazing.

Annual Subtype

Under the proposed action and alternative 3 key species would increase by 17 percent. Key shrub species would increase from 6 to 13 percent, and key grass species would increase from 7 to 17 percent. Good condition acreage would increase from 3,339 to 24,234. Fair condition acreage would decrease from 20,902 to 16,862, and poor condition acreage would decrease from 17,441 to 586.

Under alternative 1 key grass species would increase from 7 to 9 percent, and key shrub species would increase from 6 to 9 percent. Acreage in fair condition would increase from 20,904 to 22,057, and acreage in poor condition would decrease from 17,441 to 16,286. The acreage in good condition would not change.

Alternative 2 would allow an increase from 7 to 25 percent in key grass species and from 6 to 13 percent in key shrub species. Annuals are vulnerable to the increase in key perennial grasses and shrubs, since annuals precede perennials on pioneer or undisturbed sites. Under rotation grazing and low utilization of perennial species, the annuals would give way to the ecological climax perennials, previously abused and unable to recover vigor. Range condition would be the same as shown under the proposed action.

Alternative 4 would allow no changes from the current situation.

Alternative 5 would allow a decrease in key grasses from the current 16 to 14 percent. Key shrubs, however, would increase from 6 to 9 percent. Conditions of acreage would be the same as under the proposed action.

Usable forage production per acre would

- increase from 29 to 67 air dry pounds under the proposed action;
- increase to 31 air dry pounds under full stocking;
- increase to 67 air dry pounds under stocking by condition class and no vegetation manipulation; and
- increase to 51 air dry pounds under elimination of grazing.

THREATENED AND ENDANGERED PLANT SPECIES

The 25 threatened and endangered plants found in the Shivwits EIS area are mostly pioneers, occurring on badlands, frail lands, or roadside cuts, which are seldom grazed by livestock. Moreover, these plants are unpalatable. Grazing and trampling should thus not significantly impact these plants or their habitats.

Range developments also would have no known impacts on threatened and endangered species because they would not be installed in any such species habitat or because a survey and modification of facilities would prevent any possible adverse impacts.

RIPARIAN VEGETATION

The proposed grazing systems would allow perennial grasses, forbs, and sedges to improve and increase on streambanks and around springs. Woody riparian vegetation, however, would not reproduce or recover. These systems would also fail to prevent severe utilization of the riparian subtype during the graze cycle.

Observations in Colorado in a higher rainfall regime (18 to 25 inches) revealed that perennial grasses on streambanks and wash bottoms are about three times as dense under rest-rotation grazing as under season long grazing. Woody riparian vegetation, however, responds little if at all to rest-rotation grazing (Hughes, 1978).

WET MEADOW AND RIPARIAN VEGETATION

Proposed Action

The EIS area has 156 springs and associated wet meadow habitats, varying from small ephemeral seeps to 3-acre irrigated meadows. Most springs, however, are small point sources. Under the proposed action, springs containing significant wet meadow vegetation but in a deteriorated condition would be fenced.

The density of cottonwood and willow and other woody phreatophytes (except saltcedar) would continue to decline due to a lack of adequate seedling survival. Rest rotation and deferred systems fail to provide sufficient rest for seedlings to reach heights allowing them to survive the effects of grazing.

The vigor of herbaceous species may improve under deferred systems, but improvement would be at a slower rate than under rest-rotation grazing. Density and species composition of forbs and grasses are not expected to increase significantly.

Livestock would continue to heavily use spring habitats in less intensively managed allotments. Although these allotments have been adjusted to the range's estimated livestock carrying capacity, yearlong livestock use would maintain spring habitats in unsatisfactory condition.

During years of abundant ephemeral vegetation, the number of livestock grazed would be higher than the carrying capacity based on perennial vegetation. Eighteen allotments, three less intensively managed, are classified as perennial/ephemeral. Unfenced spring habitats would deteriorate faster during years of ephemeral licensing. Once ephemeral vegetation cures and is no longer succulent, livestock would congregate near springs, overgrazing herbaceous vegetation.

The Virgin River and Beaver Dam Wash flood plains contain the majority of riparian vegetation in the EIS area. Livestock obtain water along the river, extending the sacrifice area along the riparian zone.

Grazing riparian vegetation would have impacts similar to those expected in wet meadows. The vigor of herbaceous species may slightly improve, but species densities would remain static under the proposed systems. Moreover, livestock grazing inhibits already limited cottonwood and willow reproduction. Mesquite and desert willow communities, intermixed with saltcedar, provide shade for livestock, which trample young seedlings and break off branches from adult trees.

Alternative 1 — Full Stocking

The full stocking alternative would basically have the same impacts on wet meadow and riparian habitats as the proposed action. The vigor of herbaceous plants, however, might decrease slightly because of greater use of vegetation within spring habitats under rest rotation. Less intensive management of spring habitats would continue to be unsatisfactory.

In addition, sacrifice areas along the riparian zone could increase slightly. Reproduction of overstory species and vigor of herbaceous plants might not benefit as much as they would under the proposed action on allotments under rest-rotation grazing (Littlefield Community and Mesquite Community).

Alternative 2 — Stocking by Condition Class

The stocking by condition class alternative would have the same impacts on fenced springs as the proposed action. Springs on allotments deferred for 5 years would be fenced before livestock grazing is returned.

Spring vegetation on deferred allotments would significantly improve. The vigor and density of overstory and herbaceous plants would increase during the 5 years of rest. Once livestock are permitted to graze these areas, however, conditions would deteriorate to an unsatisfactory state in one or two grazing seasons.

The vigor of vegetation on wet meadow habitats on nondeferred allotments might slightly improve under utilization below 50 percent and reduced stocking levels. The riparian vegetation, however, is expected to remain in a degraded condition.

Alternative 3 — No Vegetation Manipulation

This alternative would have the same impacts on wet meadow and riparian vegetation as the proposed action.

Alternative 4 — No Action

The no-action alternative would affect the habitat around fenced springs the same as would the proposed action and alternatives 1 and 2. Vegetation around unfenced springs would remain in a deteriorated state. Livestock would continue to heavily use wet meadow species, which would exhibit poor vigor and gradually decline in density.

Alternative 5 — Elimination of Grazing on Federal Lands

Springs and 42 miles of riparian vegetation would dramatically improve within 2 years after elimination of grazing. Mortality of tree seedlings would decrease, and the density of virtually all herbaceous species would significantly increase.

LESS INTENSIVE MANAGEMENT

The proposed action would reduce stocking rates on 10 allotments so that average utilization would not exceed 45 percent. Improvement in key species composition, range condition, and usable forage production by subtype would be the same under alternatives 2, 3, 4, and 5 as under the proposed action. Under alternative 1 (full stocking) key species composition, range condition, and usable forage production would not change.

Allotments in the Vermillion Resource Area (such as Fuller Road), not under rest rotation but with grazing 30 percent below normal, have experienced upward trends similar to those expected under the proposed action and alternatives 2 and 3. The trend plots demonstrate an upward trend in key species at average utilization of 48 percent. The severe drought of 1977, accompanied by grazing, however, reduced the ground cover of key species (BLM, 1979).

Conversely, the static trend expected under alternative 1 occurred in Buffalo Tank allotment in the Vermillion Resource Area, where trend plots demonstrate the effect of nonrotation grazing under high utilization. Buffalo Tank's trend plots show a slight decrease in key species composition. Drought and high utilization (57 percent), however, have drastically reduced ground cover, and trend is down (BLM, 1979).

Less intensive management would not impact threatened and endangered species because most are pioneer species, unpalatable to and seldom grazed by livestock.

The lack of rotation grazing would prevent the healing of sacrifice and livestock gathering areas.

RANGE IMPROVEMENT PROJECTS

Construction (site preparation, construction, and vehicular traffic) of range improvements would temporarily disturb 119 acres of vegetation. Such projects, however, would permanently disturb 121 to 2,345 acres of vegetation. Such disturbance would result mostly from new waters, which would allow livestock to more heavily graze previously ungrazed or lightly grazed areas.

SOILS

The proposed action and alternatives 1, 2, 3, and 5 would generally benefit soils. The reduction of livestock AUMs by an average of 28 percent under the proposed action and alternative 3, 9 percent under alternative 1, 64 percent under alternative 2, and 100 percent under alternative 5 would increase ground cover (litter and vegetation), reduce soil movement, and reduce raindrop impact. These actions would decrease compaction, increasing infiltration rates and water retention. Soil movement and erosion are expected to decline.

Alternative 4 would generally decrease ground cover (litter and vegetation) and increase soil movement and erosion. Compaction would increase, reducing infiltration rates and water retention.

EROSION

The proposed action would increase total ground cover, organic matter, fertility, and infiltration. It would reduce compaction and soil erosion on 1,572,209 acres and maintain static conditions on 276,685 acres. Alternative 1 (full stocking with management) would reduce erosion on 1,583,765 acres and maintain static conditions on 265,129 acres. Erosion would decrease on the total EIS area for alternatives 2 (stocking by condition class) and 5 (elimination of grazing). Alternative 3 (no vegetation manipulation) would reduce soil erosion on 1,448,544 acres and maintain static condition on 400,350 acres. Soil fertility would decrease on the total EIS area for alternative 4. See table 3-4, Analysis of Impacts on Soils. Finer textured soils such as Shalet clay loam, Tours silty clay loam and silt loam, would respond most to the proposals that tend to increase ground cover and reduce erosion if precipitation amounts are adequate.

The proposed action and alternative 2 would decrease areas of severe or critical erosion by 68 percent (38,045 acres). Alternatives 1 and 3 would decrease these areas by 51 percent (31,999 acres). Alternative 4 would increase areas of severe or critical erosion by 86 percent (48, 008 acres). Alternative 5 would decrease these areas by 69 percent (38,178 acres). See table 3-5, Erosion Condition Class.

SEDIMENT YIELD

On-site data were obtained from the BLM Phase I Watershed Conservation and Development inventory and applied to the Pacific Southwest Interagency Committee (1968) method for determining sediment yields.

The proposed action and each alternative would impact ground cover, litter, organic matter, fertility, compaction, and infiltration as shown on table 3-4.

Additional ground cover and litter would reduce the impact of rainfall, encourage infiltration, and hold precipitation in place, thereby reducing runoff. Reduced soil compaction and improved infiltration would result in less runoff and thus less sediment yield. On the other hand, reduced ground cover, litter, and organic matter and increased compaction would increase sediment yield. The expected changes for the proposal and each alternative have been analyzed and are summarized below.

Under the proposed action annual sediment yield in the EIS area would decline by an estimated 66.4 acre-feet or 7.5 percent. Under alternative 1 (full stocking) reductions would amount to 53.0 acre-feet or 6.0 percent. Under alternative 2 (stocking by condition class) reductions would amount to 79.2 acre-feet or 9.0 percent. Under alternative 3 (no vegetation manipulation) reductions would amount to 18.6 acre-feet or 2.1 percent. Under alternative 4 (no action) sediment yield would increase by 58.0 acre-feet or 6.5 percent. And under alternative 5 (elimination of grazing) annual sediment yield would be reduced by an estimated 113.3 acre-feet or 12.9 percent. Table 3-6 shows existing sediment yield and sediment yield expected under the proposed action and its alternatives by allotment. (See appendix 2-2 for methodology.)

The weighted average annual sediment yield for all allotments is estimated to be 0.30 acre-feet per square mile at present. It would remain the same under alternative 3, but decline to 0.28 acre-feet per square mile under the proposed action, 0.29 acre-feet per square mile under alternative 1, and 0.27 acre-feet per square mile under alternatives 2 and 5. Under alternative 4 it would increase to 0.35 acre-feet per square mile.

LAND TREATMENT

BLM resource specialists considered soil suitability for plowing, discing, chaining, and burning in proposing land treatments for the proposed action and alternatives 1 and 2. Areas proposed for treatment occur mainly on soils in associations 3, 4, 5, 6, 7, 8, and 10, which are best suited for land treatment and have the highest potential for successful seeding. Alternatives 3, 4, and 5 propose no land treatment.

Some 85,760 acres of pinyon-juniper would be uprooted by chaining in the Cottonwood, Grassie Mountain, Jump Canyon, Mud and Cane Spring, Pa's Pocket, Wildcat, and Wolfhole Mountain allotments. This chaining would disturb the soil in the short term but would benefit or have little effect on the soil if the slash debris is left in place (Gifford and others, 1970). Studies in southern Utah have demonstrated no consistent increase or decrease in sediment yield following the clearing of pinyon-juniper and seeding to grass (Gifford, 1973).

The potential sediment yield for these areas would be 30.86 acre-feet per year until seeding establishment in 2 or 3 years.

TABLE 3-4
Analysis of Impacts on Soils

TABLE 3-4
ANALYSIS OF IMPACTS ON SOILS

Proposed Action			Changes In				
Grazing System	Area Affected	Acres	Ground Cover and Litter	Organic Matter and Fertility	Compaction	Infiltration	Sediment Yield Ac Ft/Mi^2
Four Pasture Rest-Rotation System	All	243,069	Increase	Increase	Decrease	Increase	Slight to moderate decrease .01 to .05
Three Pasture Rest-Rotation System	All except allotments listed below:	825,338	Increase	Increase	Decrease	Increase	Slight to moderate decrease 0. to .05
	Diamond Butte	5,455	Increase	Increase	Decrease	Increase	High decrease 0.08
	Hidden and Sullivan Parashaunt	237,760	Remain static	Remain static	Remain static	Remain static	Remain static
Deferred Rotation System	All except allotments listed below:	381,378	Increase	Increase	Decrease	Increase	Slight to moderate decrease 0.0 to 0.05
	Penns Well	23,187	Increase	Increase	Decrease	Increase	High decrease 0.08
	Jump Canyon	27,369	Remain static	Remain static	Remain static	Remain static	Remain static
Less Intensive Management	All except allotments listed below:	86,332	Increase	Increase	Decrease	Increase	Slight to moderate decrease 0. to 0.05
	Pat's Pond Rosenberry Shelly	7,450	Increase	Increase	Decrease	Increase	High decrease 0.07 to 0.10
	Littlefield Free Use Quail Canyon	11,556	Remain static	Remain static	Remain static	Remain static	Remain static

Alternative #1 Full Stocking With Management			Changes In				
Grazing System	Area Affected	Acres	Ground Cover and Litter	Organic Matter and Fertility	Compaction	Infiltration	Sediment Yield Ac Ft/Mi^2
Four Pasture Rest-Rotation System	All	243,069	Slight increase	Slight increase	Slight decrease	Slight increase	Slight decrease 0.01 to 0.02
Three Pasture Rest-Rotation System	All except allotments listed below:	830,793	Slight increase	Slight increase	Slight decrease	Slight increase	Slight decrease 0.0 to 0.02
	Hidden and Sullivan Parashaunt	237,760	Remain static	Remain static	Remain static	Remain static	Remain static
Deferred Rotation System	All except allotments listed below:	404,565	Slight increase	Slight increase	Slight decrease	Slight increase	Static to slight decrease 0.0 to 0.02
	Jump Canyon	27,369	Remain static	Remain static	Remain static	Remain static	Remain static
Less Intensive Management	All	105,338	Static to slight increase	Static to slight increase	Slight decrease	Slight increase	Slight increase to moderate decrease 0.01 to 0.03

Alternative #2 Stocking By Condition Class			Changes In				
Grazing System	Area Affected	Acres	Ground Cover and Litter	Organic Matter and Fertility	Compaction	Infiltration	Sediment Yield Ac Ft/Mi^2
Four Pasture Rest-Rotation System	All except allotment listed below:	237,104	Increase	Increase	Decrease	Increase	Moderate decrease 0.03 to 0.05
	Little Tank	5,965	Increase	Increase	Decrease	Increase	High decrease 0.07
Three Pasture Rest-Rotation System	All	1,068,553	Increase	Increase	Decrease	Increase	Slight to moderate decrease 0.02 to 0.06
Deferred Rotation	All except allotment listed below:	408,747	Increase	Increase	Decrease	Increase	Slight to moderate decrease 0.02 to 0.06
	Penns Well	23,187	Increase	Increase	Decrease	Increase	High decrease 0.09
Less Intensive Management	All except allotments listed below:	97,888	Increase	Increase	Decrease	Increase	Slight to moderate decrease 0.01 to 0.06
	Pat's Pond Rosenberry Shelly	7,450	Increase	Increase	Decrease	Increase	High decrease 0.07 to 0.10

Alternative #3 No Vegetation Manipulation			Changes In				
Grazing System	Area Affected	Acres	Ground Cover and Litter	Organic Matter and Fertility	Compaction	Infiltration	Sediment Yield Ac Ft/Mi^2
Four Pasture Rest-Rotation System	All except allotment listed below:	217,216	Static to slight increase	Slight increase	Slight decrease	Static to slight increase	Slight decrease 0.01
	Mule Canyon	25,853	Remain static	Remain static	Remain static	Remain static	Remain static
Three Pasture Rest-Rotation System	All except allotments listed below:	801,531	Static to slight increase	Slight increase	Slight decrease	Static to slight increase	Slight decrease 0.01
	Mesquite Community Parashaunt	258,022	Remain static	Remain static	Remain static	Remain static	Remain static
Deferred Rotation System	All except allotments listed below:	336,401	Static to slight increase	Static to slight increase	Static to slight decrease	Static to slight increase	Slight decrease 0.01
	Jump Canyon Sullivan Tank Whiterock-Soapstone	95,533	Remain static	Remain static	Remain static	Remain static	Remain static
Less Intensive Management	All except allotments listed below:	84,396	Static to slight increase	Slight increase	Static to slight decrease	Static to slight increase	Slight decrease 0.01 to 0.02
	Littlefield Free Use Iverson Pat's Pond Quail Canyon Shelly Snyder	20,942	Remain static	Remain static	Remain static	Remain static	Remain static

Alternative #4 No Action			Changes In				
Grazing System	Area Affected	Acres	Ground Cover and Litter	Organic Matter and Fertility	Compaction	Infiltration	Sediment Yield Ac Ft/Mi^2
Four Pasture Rest-Rotation System	All	243,069	Decrease	Decrease	Increase	Decrease	Moderate increase 0.04 to 0.06
Three Pasture Rest-Rotation System	All except allotments listed below:	1,050,077	Decrease	Decrease	Increase	Decrease	Moderate increase 0.03 to 0.06
	Diamond Butte	18,476	Decrease	Decrease	Increase	Decrease	High increase 0.07
	Wolfhole Lake						
Deferred Rotation System	All	431,934	Decrease	Decrease	Increase	Decrease	Moderate increase 0.03 to 0.06
Less Intensive Management	All except allotments listed below:	84,553	Decrease	Decrease	Increase	Decrease	Moderate increase 0.05 to 0.06
	Mustang Spring Purgatory Rosenberry	20,785					High increase 0.06 to 0.09

Alternative #5 Eliminate Grazing			Changes In				
Grazing System	Area Affected	Acres	Ground Cover and Litter	Organic Matter and Fertility	Compaction	Infiltration	Sediment Yield Ac Ft/Mi^2
Four Pasture Rest-Rotation System	All except allotment listed below:	237,104	Increase	Increase	Decrease	Increase	Moderate decrease 0.03 to 0.06
	Little Tank	5,965	Increase	Increase	Decrease	Increase	High decrease 0.07
Three Pasture Rest-Rotation System	All except allotments listed below:	1,028,376	Increase	Increase	Decrease	Increase	Moderate decrease 0.03 to 0.06
	Diamond Butte Pakoon Spring	40,177					High decrease 0.07 to 0.13
Deferred Rotation System	All except allotment listed below:	408,747	Increase	Increase	Decrease	Increase	Moderate decrease 0.03 to 0.05
	Penns Well	23,187	Increase	Increase	Decrease	Increase	High decrease 0.09
Less Intensive Management	All except allotments listed below:	81,078	Increase	Increase	Decrease	Increase	Moderate decrease 0.04 to 0.06
	Mustang Spring Pat's Pond Purgatory Rosenberry Shelly	24,260	Increase	Increase	Decrease	Increase	High decrease 0.07 to 0.12

TABLE 3-5
EROSION CONDITION CLASSES (Federal Acres)

	Stable	Slight	Moderate	Critical	Severe
Present Situation	6,804	628,527	705,779	54,771	1,060
Proposed Action, Alt. 2	31,341	874,090	473,724	16,726	1,060
Alternatives 1, 3	17,282	757,234	598,593	22,772	1,060
Alternative 4	0	493,407	799,695	102,779	1,060
Alternative 5	34,475	917,328	428,025	16,159	954

Source: BLM Watershed Conservation and Development System. Computer printout FREM065 (3/17/77).

TABLE 3-6
SEDIMENT YIELD* BY ALLOTMENT

Allotment Name	No.	Present	Proposed Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Beaver Dam Slope	3	14.7	13.5	13.5	13.2	14.3	13.5	12.9
Black Rock	15	19.9	18.7	18.9	17.9	19.4	18.7	17.5
Blake Pond	6	11.3	10.7	10.7	10.2	11.0	12.9	9.9
Clay Spring	12	6.8	6.2	6.2	6.2	6.6	6.2	6.0
Cottonwood	21	15.5	15.0	14.7	14.0	15.1	17.7	13.6
Diamond Butte	31	4.5	3.8	4.3	3.6	4.4	5.1	3.4
Duncan Tank	37	4.5	4.2	4.3	4.0	4.4	4.2	4.0
Grassie Mountain	48	47.8	44.3	45.4	43.0	46.6	54.5	42.1
Hidden and Sullivan	25	16.4	16.4	16.4	14.8	16.0	18.7	14.4
Ivanpah	40	6.6	5.9	6.3	5.9	6.4	5.9	5.8
Iverson	34	1.7	1.5	1.6	1.5	1.7	1.9	1.5
Jackson Tank	10	4.9	4.3	4.3	4.2	4.8	4.3	4.3
Jump Canyon	26	12.8	12.8	12.8	11.6	13.0	14.6	11.3
Last Chance	42	16.5	15.9	15.9	14.8	16.1	18.8	14.5
Littlefield Community	18	52.7	47.9	47.9	47.4	51.4	60.1	46.4
Littlefield Free Use	19	1.4	1.4	1.4	1.3	1.4	1.6	1.2
Little Tank	30	3.3	2.8	3.1	2.6	3.2	2.8	2.6
Little Wolf	23	4.1	4.0	4.1	3.7	4.0	4.0	3.6
Lizard	7	7.0	6.4	6.4	6.3	6.8	8.0	6.2
Lower Hurricane	9	31.8	27.8	30.2	27.6	31.0	27.8	27.0
Mainstreet	28	57.3	50.5	50.5	50.0	55.9	50.5	50.4
Mesquite Community	20	24.2	23.3	23.3	21.8	23.6	27.5	21.3
Mormon Well	2	6.7	6.2	6.2	6.0	6.5	7.6	5.9
Mosby-Nay	45	11.2	9.6	9.6	9.5	10.9	12.8	9.4
Mt. Trumbull	35	14.9	13.9	14.2	13.4	14.5	13.9	13.1
Mud and Cane Spring	22	34.1	32.7	32.8	30.7	33.3	38.9	30.0
Mule Canyon	39	10.1	8.9	8.9	8.7	9.8	11.5	8.9
Mustang Spring	16	9.0	8.7	8.8	8.1	8.8	10.2	7.9
Pakoon	43	21.4	20.7	20.8	18.3	20.9	24.4	18.8
Pakoon Spring	44	17.9	14.7	14.7	16.1	17.5	20.4	14.0
Parashaunt	50	63.3	63.3	63.3	57.0	64.0	63.3	55.7
Pa's Pocket	38	7.7	6.3	7.3	6.1	7.5	8.8	6.2
Pat's Pond	33	0.9	0.8	0.9	0.8	0.9	1.0	0.8
Penns Well	49	16.3	13.4	13.4	13.0	15.9	17.1	13.0
Poverty	41	36.2	33.8	33.8	32.6	35.3	33.8	31.9
Purgatory Canyon	5	6.4	6.2	6.4	5.8	6.2	7.3	5.6
Quail Canyon	13	4.8	4.8	4.9	4.3	4.8	5.5	4.2
Rosenberry	32	4.2	3.6	4.0	3.6	4.1	4.8	3.5
Shelly	29	1.5	1.3	1.4	1.3	1.5	1.7	1.3
Snyder	36	1.9	1.7	1.8	1.7	1.9	2.2	1.7
Sullivan Canyon	17	16.4	14.4	15.6	14.2	16.0	14.4	14.4
Sullivan Tank	27	5.5	5.1	5.1	5.0	5.4	6.3	4.8
Sunshine	8	10.4	9.9	9.9	9.4	10.1	11.9	9.2
Tassi	46	59.8	54.0	54.0	53.8	58.3	68.2	52.6
Toquer Tank	11	7.4	6.8	6.8	6.7	7.2	6.8	6.5
Whiterock-Soapstone	24	8.2	7.9	7.9	7.4	8.0	7.9	7.2
Wildcat	47	57.6	50.4	54.6	49.8	56.2	65.7	49.5
Wolfhole Canyon	1	38.2	35.9	35.9	34.4	37.3	43.5	33.6
Wolfhole Lake	14	9.1	8.9	9.0	8.2	8.9	10.4	8.0
Wolfhole Mountain	4	34.6	33.8	33.8	31.1	34.0	39.4	30.5
Unallotted								
Total for ES area		881.4	815.0	828.0	802.2	862.8	939.0	768.1

* In acre feet per year

Based on figures derived from Denver Service Center adaptation of Pacific Southwest Interagency Committee (1968) method of calculating sediment yields.

Under the proposed action and alternatives 1 and 2, 25,100 acres of sagebrush would be plowed or disced and seeded. A comparable impact can be expected on those areas of the Grassie Mountain, Blake Pond, Wildcat, Wolfhole Canyon, and Wolfhole Mountain allotments. Estimated annual sediment yield would amount to 8.35 acre-feet for this short term (2 or 3 years). In the long term, when soil-stabilizing ground cover becomes established, this treatment would benefit soil.

A total of 17,650 acres of blackbrush is scheduled to be burned and seeded to grass in the Mud and Cane Spring, Wildcat, and Wolfhole allotments. Approximately 7.5 acre-feet of sediment would be lost during a 2- or 3-year period until seedings become established.

The above land treatments are scheduled over a 5-year period, so only a portion of the sediment would be lost during any given year. Land treatment on a total of 3,220 acres would result in an estimated total sediment loss of 47 acre-feet over a 2- or 3-year period. This loss, however, would be offset in the long term by a reduction of 66 acre-feet per year under the proposed action, 37 acre-feet per year under alternative 1 (full stocking), and 79 acre-feet per year under alternative 2 (stocking by condition class).

CONSTRUCTION

The installation of 129 miles of fences under the proposed action and alternatives 1, 2, and 3 would have adverse, localized, and short-term impacts. Increases in sediment yield would be insignificant after completion of construction. The no-action alternative would require no fence construction, but elimination of grazing would require 423 miles of fences to keep livestock off Federal lands. Fence building would increase sediment yield by 2 acre-feet per year for 2 or 3 years following construction but would cause only insignificant losses on 65 acres over the long term.

The 27 miles of two-track road needed for the construction and maintenance of the water developments, fences, and pipelines under the proposed action and alternatives 1, 2, 3, and 5 would little increase sediment yield in the area. The no-action alternative would not increase sediment yield from the construction of two-track roads.

WATER FACILITIES

BLM studies in the Arizona Strip indicate that under the proposed action and alternatives 1, 2, and 3, about 4.5 acres would be seriously impacted and up to 35 acres less seriously impacted by the trampling and compaction around each of the 68 proposed water developments. Estimated total soil erosion losses would range from 1.0 to 1.5 acre-feet per year, depending upon location, use, and climatic conditions. Alternatives 4 and 5 call for no additional water facilities.

Projects would be built over a 5-year period on various allotments, and total sediment yield would vary from year to year, limiting amounts to less than 2 or 3 acre-feet for any year during construction. Increased water facilities would decrease livestock concentration around such facilities, reducing sediment yield.

WATER RESOURCES

WATER QUANTITY

The decrease in livestock grazing under the proposed action and alternatives 1, 2, 3, and 5 would increase ground cover since fewer livestock would consume vegetation than at present. This increase in ground cover would decrease surface flow by a shielding, binding, and filtering action, which in turn would increase water infiltration, particularly in soil associations 3, 4, 6, 7, and 8 and to a lesser extent in the other areas (amounting to 282,954 acres or 15 percent of the EIS area). Increased infiltration would decrease the amount of water leaving the area as runoff. New livestock and wildlife watering facilities would also reduce slightly the amount of water leaving the area by storing water during high-intensity summer rains. Such new facilities would store about 45 acre-feet and occupy 6 surface acres. Under the no-action alternative range conditions would not improve, and runoff might increase over time.

WATER QUALITY

The proposed action and alternatives 1, 2, 3, and 5 would, overall, improve the water quality of the EIS area. The proposed action would reduce sediment yield by 66.4 acre-feet per year. Alternative 1 (full stocking) would reduce sediment yield by 37.4 acre-feet per year, alternative 2 (stocking level by condition class) by 79.2 acre-feet per year, alternative 3 (no vegetation manipulation) by 18.6 acre-feet per year, and alternative 5 (elimination of grazing) by an estimated 113.3 acre-feet per year. Alternative 4 (no action) would increase sediment yield by 122.1 acre-feet per year with an accompanying reduction of water quality. See table 3-6, Sediment Yield by Allotment.

The Colorado River Study Team (1978) found that grazing management is a technically and environmentally feasible means of controlling runoff, erosion, and salinity entering streams. The team also found that evapotranspiration generally equals precipitation in areas receiving less than 16 inches of precipitation. Thus runoff entering perennial streams would be insignificant as grazing management and land treatment are applied to keep water and sediment on site.

Increases in water infiltration rates expected under the proposal and alternatives 1, 2, 3, and 5 would slightly increase the total dissolved solids (TDS) that eventually leave the region. BLM field checks in the EIS area indicate that TDS is higher in water from springs than in surface runoff. TDS under alternative 4 would remain nearly static.

The Virgin River is the only perennial stream in the EIS area, and most of its drainage area is in Utah. BLM contracted with the U.S. Geological Survey for a study of the Virgin River. Preliminary unpublished data for the river at Littlefield, Arizona show average specific conductance for this flow to be 2,545 micromhos/centimeter at 25°C., a rather high level for livestock. The mineral content is largely dissolved sulfate and bicarbonate with significant amounts of sodium, calcium, and magnesium. During high flow the greater portion of this runoff can be attributed to the Utah portions of the Virgin River drainage. Specific conductance in surface water reservoirs ranges from 600 to about 1,000 micromhos/centimeter but in some springs reaches to as high as 3,000 micromhos/centimeter.

Nutrient and bacteria changes to perennial streams would be insignificant and have little or no effect on fish or other downstream uses, since only a small portion of the total flow of these streams comes from the EIS area.

ANIMALS

The analysis of the impacts of the proposed action and its alternatives on wildlife focuses on habitat components — food, water, cover, and space. The probable impact of livestock grazing (utilization, grazing system, and period of use) on vegetation is evaluated to determine the extent and degree of livestock-wildlife conflict.

The effects of livestock grazing on wildlife populations and their habitats is complex, involving many interrelationships that are not clearly understood. Impacts are thus discussed according to specific groups of wildlife except where data exist for individual species.

ANALYSIS OF RANGE CONDITION RATING SYSTEM

Range condition in the EIS area has been rated by the diversity and total percentage of key forage species for livestock. Directly correlating this sytem to wildlife habitat condition is impossible. Various wildlife species extensively use nonpalatable plant species not considered in this range condition rating system. Likewise, the forb component, which is extremely important at various times of the year to both game and nongame has not been incorporated in the range condition rating system.

A community with a high plant species diversity (rated as good range condition) does not necessarily support high animal species diversity and vice versa. The pinyon-juniper woodland, for example, is rated in poor range condition because it lacks understory vegetation. This vegetation subtype, however, supports rich nongame bird populations because its vertical and horizontal structure provides more available niches than some communities with higher plant species diversity. MacArthur and MacArthur (1961) demonstrated the importance of structural diversity on bird species.

Only for large ungulates using forage species in common with livestock can livestock range condition be correlated to wildlife and habitat condition.

ASSUMPTIONS

The assessment of impacts on animals is based on the following assumptions.

- Each year grazing on all areas above 6,000 feet will be deferred from October/November to June.

- Two-pasture deferred grazing systems involving 148,968 acres will not provide for the needs of key wildlife forage species.

- The condition of the 105,338 acres in allotments under less intensive management is expected to remain static under the proposed action. Conditions would improve slightly under alternative 2 (stocking level by condition class) and moderately under alternative 5 (elimination of grazing on Federal lands).

- Sufficient forage (15,630 AUMs) will be allocated to meet big-game and nongame (desert tortoise) needs under the proposed action and alternatives 1, 2, 3, and 5. No forage would be allocated under alternative 4 (no action).

- The proposed land treatments, involving 124,610 acres, will be designed to enhance big-game habitat and maintain healthy nongame wildlife populations in and near treated areas.
- Treated areas will decrease the diversity of nongame wildlife populations but improve habitat conditions for mule deer and pronghorn antelope.
- Significant spring and riparian habitats in a deteriorated condition will be fenced under the proposed action and alternatives 1, 2, 3, and 4.
- Under the proposed action and alternatives 1, 2, 3, and 4 reservoirs containing water 7 months out of the year and providing important waterfowl and shorebird habitat will be partially fenced to improve shoreline vegetation.
- Unsuitable areas and communities with little palatable understory vegetation have been rated in poor range condition.
- Bighorn sheep habitat has mostly been allotted to areas classified as unsuitable for livestock.
- The proposed action and alternatives are not expected to increase the distribution of desert bighorn sheep populations within the EIS area.
- Livestock will graze important tortoise denning areas only in the winter (November-February). If spring, summer, or fall grazing is allowed, tortoise concentration areas will be fenced out of the allotment.
- The proposed action and alternatives will not significantly impact endangered and threatened species within the EIS area.
- Reservoirs will not be fenced in big-game habitats.

The following text summarizes the data shown in table 3-7. The specific impacts are shown in table 3-7. Table 3-8 summarizes projected trends in wildlife habitat. (Also see appendix 3-7.)

GRAZING SYSTEMS

Proposed Action

The proposed action would improve overall wildlife habitat throughout the EIS area, primarily because of the proposed 50 percent average utilization of key forage species. Additional stipulations would also benefit wildlife:

1. During a 3-year period a specific area would be grazed only during one spring growing period. Spring forbs and cool-season grasses would increase in vigor and density. The apparent improvement in range succulence would enhance fawning and rearing areas for big-game species and increase nesting success.

2. An area would not be grazed more than two summer growing seasons in a 3-year period, benefiting warm-season grasses, forbs, and browse. All available summer forb production 1 out of 3 years would improve habitat components for game and nongame wildlife species. Rest during the summer would decrease the stress of the critical fall drought.

3. At elevations above 6,000 feet grazing would not begin before June 1, which would help relieve the stress of spring drought through increased range succulence. Big-game species in particular would be on a higher nutritional plane than if areas were grazed before June 1. In the EIS area mule deer drop fawns around the middle of June, and fawn production and survival would increase due to improved habitat conditions. Nongame species would also benefit from the deferment of early forb and grass production.

Browse, cool- and warm-season grasses, and forbs are expected to increase in species composition over most allotments, decreasing livestock-wildlife competition for food and cover. Light to moderate livestock grazing pressure would stimulate the growth of the forage species used by livestock and wildlife.

Rest Rotation

Rest-rotation systems have the greatest potential to upgrade wildlife habitat because of their longer rest periods (16 months), which particularly favor browse. A total of 1,095,193 acres of habitat would be managed under three- and four-pasture rest-rotation systems, and each year 414,159 acres would be rested.

Deferred Systems

Periodic rest of pastures during critical spring and summer growing seasons would increase the production of all vegetation — browse, grass, and forbs. The resulting increase in cover and diversity of vegetation should improve habitat for the majority of wildlife species.

TABLE 3-7
IMPACTS TO WILDLIFE

PROPOSED ACTION

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
MULE DEER				
Grazing				
Rest Rotation	Improving: 106,215 acres	Long term Beneficial	High	Browse species, such as cliffrose, serviceberry, mountain mahogany, Gambel oak, turbinella oak, and fourwing saltbush would increase in vigor and density. The increase in desirable forbs and grasses in the early spring could potentially increase fawn survival (Julander, Robinette and Jones, 1961).
	Static good: 21,828 acres	Long term Beneficial	Mod.	97,134 acres of habitat would improve to good as a result of land treatments, mostly in the pinyon-juniper and sagebrush zones. Mule deer would particularly benefit from increased range succulence of treated areas.
	Static fair: 179,217 acres	Long term Beneficial	High	
	Static poor: 276,411 acres	Long term Beneficial	High	
Deferred Systems	Improved habitat: 32,714 acres	Long term Beneficial	Mod.	Less livestock competition would increase key forage species. Forbs and grasses would benefit more than browse (three pasture deferred system).
	Static good: 991 acres	Long term Beneficial	Low	
	Static fair: 974 acres	Long term Beneficial	Low	
	Static poor: 67,488 acres	Long term Beneficial	Mod.	
	3,241 acres in Clay Spring, 5,783 acres in Penns Well and 11,123 acres in Wolfhole Mountain allotments would decline.	Long term Adverse	Low	20,147 acres of habitat would deteriorate under two-pasture deferred systems.
Less Intensive Management	Static good: 705 acres	Long term Beneficial	Low	
	Static fair: 8,116 acres	Long term Adverse	Low	Mule deer habitat conditions would remain static, and little improvement in forage is expected. Key deer forage species, such as cliffrose, Mormon tea, and fourwing saltbush, would not obtain adequate rest.
Range Improvements				
Water	28 water developments	Long term Beneficial	Mod.	Deer could expand into previously waterless areas since each water would provide a 1.5-mile water service area for mule deer. Developing waters in previously waterless areas would also increase wildlife-livestock forage competition.
Fences	54 miles	Long term Adverse	Low	Fences would alter deer movement patterns and increase potential mortality from entanglement.
Deferred Systems	Improving to good: 32,714 acres	Long term Areawide Beneficial	Mod.	Land treatment would improve 29,601 acres. 3,104 acres would improve from grazing management. Browse, forbs, and cool- and warm-season grasses would increase in vigor and density, benefiting herd productivity. Good forage is especially important for fawn survival (Julander, Robinette, and Jones, 1961).
	Static good: 991 acres	Long term Beneficial	Low	
	Static fair: 974 acres	Long term Beneficial	Low	
	Static poor: 67,488 acres	Long term Areawide beneficial	Mod.	
	20,157 acres of habitat declining	Long term Adverse	Mod.	Two-pasture deferred grazing would cause a downward trend in key mule deer forage species. Under heavy grazing, cattle feed principally on forbs and grasses, competing with deer. (Julander, 1958).

TABLE 3-7 (continued)

ALTERNATIVE #1

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
		MULE DEER		
Grazing				
Rest Rotation	Improving to good: 86,452 acres	Long term Adverse	High	Land treatment would improve 77,461 acres. 9,081 acres would improve due to grazing management. 75% utilization would cause browse and herbaceous species to decrease in vigor and density. Rest-rotation systems above 6,000 feet (summer range) could significantly degrade fawning habitat under this high utilization. Higher utilization is expected on treated areas than under the proposed action on treated areas, causing habitat conditions to decline more rapidly. The increase in range succulence created through land treatment would less benefit deer than it would under proper stocking rates.
	Static good: 21,828 acres	Long term Adverse	Mod.	
	Static fair: 198,890 acres	Long term Adverse	High	
	Static poor: 276,411 acres	Long term Adverse	High	
Less Intensive Management	Static good: 705 acres	Long term Beneficial	Low	Same impacts as expected under the proposed action.
	Static fair: 974 acres	Long term Beneficial	Low	
	Static poor: 67,488 acres	Long term Beneficial	Mod.	Habitat conditions would remain static. Little improvement in key forage species is expected. Deer need adequate yearlong forage for maximum herd productivity (Julander, Robinette, and Jones, 1961).
Range Improvements				
	Same as proposed action.			

ALTERNATIVE #2

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
		MULE DEER		
Grazing				
Rest Rotation	Improve to good: 106,215 acres	Long term Beneficial	High	Land treatment would improve 97,134 acres. Grazing systems would improve 9,081 acres.
	Improve to fair: 2,701 acres	Long term Beneficial	Low	Generally forage conditions are expected to improve. Livestock-wildlife competition would decline. This proposal should enhance habitat conditions at a faster rate than the proposed action.
	Static good: 21,828 acres	Long term Beneficial	Mod.	Stocking and utilization would be adjusted according to range condition and trend.
	Static fair: 179,217 acres	Long term Beneficial	High	
	Static poor: 273,710 acres	Long term Beneficial	High	Allotments deferred for 5 years (short-term benefit).
Deferred System	Improved habitat to good condition 32,714 acres	Long term Beneficial	Mod.	Grazing management would improve 29,610 acres.
	Static good: 991 acres	Long term Beneficial	Low	3,104 acres would improve due to land treatment. As with rest-rotation grazing, the vigor and density of cliffrose, Gambel oak, serviceberry, mountain mahogany, and turbinella oak and various forbs would increase.
	Static fair: 974 acres	Long term Beneficial	Low	
	Static poor 67,488 acres	Long term Beneficial	Mod.	Allotments deferred for 5 years (short-term benefit).
	20,157 acres of habitat declining (Two pasture deferred systems).	Long term Adverse	Mod.	Same impacts as expected under the proposed action.
Less Intensive Management	Static good: 705 acres	Long term Beneficial	Low	Same impacts as expected under the proposed action.
	Static fair: 8,116 acres	Long term Beneficial	Low	
Range Improvements				
Water	54 water developments	Long term Beneficial	Mod.	Construction of projects would be delayed for 5 years on allotments in poor range condition.
Fences	13 miles	Short term	Low	Same impacts as expected under the proposed action for both water developments and fences.

TABLE 3-7 (continued)

ALTERNATIVE #3

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
MULE DEER				
Grazing				
	104 miles	Long term Adverse	High	
	26 miles	Short term Beneficial	Low	
Rest Rotation	Improve to good condition: 9,081 acres	Long term Beneficial	Low	Grazing management would improve 9,081 acres. Same impacts as expected under the proposed action.
	Static good: 21,092 acres	Long term Beneficial	Mod.	Same impacts as expected under the proposed action.
	Static fair: 213,130 acres	Long term Beneficial	High	
	Static poor: 330,368 acres	Long term Beneficial	High	
Deferred Systems	Improve to good condition 3,104 acres	Long term Beneficial	Low	3,104 acres would improve due to grazing management. Same impacts as expected under the proposed action.
	Static good: 991 acres	Long term Beneficial	Low	Same impacts as expected under the proposed action.
	Static fair: 974 acres	Long term Beneficial	Low	
	Static poor: 97,098 acres	Long term Beneficial	High	
Less Intensive Management	Static good: 705 acres	Long term Beneficial	Low	
	Static fair 8,116 acres	Long term Beneficial	Low	
Range Improvements				
Water	67 water developments	Long term Beneficial	High	Same impacts as expected under the proposed action.
Fences	130 miles	Long term Adverse	Mod.	Same impacts as expected under the proposed action.

ALTERNATIVE #4

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
MULE DEER				
Grazing				
Rest Rotation	Improving to good condition: 7,848 acres	Long term Beneficial	Mod.	Mule deer habitat conditions on approximately 132,675 acres (AMPs) should improve. Proper stocking and season of use would enhance browse species, cool- and warm-season grasses, and forbs. Impact would be basically the same as under the proposed action.
	Static good: 21,828 acres	Long term Beneficial	Mod.	
	Static fair: 248,399 acres	Long term Beneficial	High	
	Static poor: 326,731 acres	Long term Beneficial	High	
Deferred System	Static good: 991 acres	Long term Beneficial	Low	Mule deer habitat within non-AMP allotments (618,913 acres) would continue to decline. Heavy utilization of browse, grass, and forb species would degrade habitat. Sage, juniper, rabbitbush, mountain mahogany, and cliffrose would increase in overgrazed areas. Although these plants provide cover and occasionally forage, they alone do not provide for good herd productivity (Julander, Robinette, and Jones, 1961). A decrease in the composition and density of forbs and grasses would reduce fawn production and survival because of a lower nutritional level.
	Static fair: 4,078 acres	Long term Beneficial	Low	
	Static poor: 101,058 acres	Long term Beneficial	High	
	*618,913 acres (Non-AMPs) of habitat is anticipated	Long term Beneficial	High	
	Clay Spring - 3,251 ac.	Long term Adverse	Low	Two-pasture deferred systems would not meet the needs of mule deer forage species (implemented AMPs).
Less Intensive Managment	Static good: 705 acres	Long term Beneficial	Low	
	Static fair: 8,166 acres	Long term Beneficial	Low	
	Diamond Butte - 654 ac. Iverson - 54 ac. Mustang Spring - 5,197 ac. Quail Canyon - 2,919 ac. Total 8,824 ac.	Long term Adverse	Mod.	8,824 acres of mule deer habitat is expected to decline as a result of no action (excessive utilization).
Range Improvements				
Water	12 water developments	Long term Beneficial	Mod.	The current distribution of mule deer would improve. Same impacts as expected under the proposed action.
Fences	7.7 miles	Long term Adverse	Low	Additional fences would hinder deer movements and possibly increase mortality.

*Included in above averages

TABLE 3-7 (continued)

PROPOSED ACTION

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
PRONGHORN ANTELOPE				
Grazing				
Rest Rotation	Improving to good: 12,938 acres	Long term Beneficial	Mod.	Increases in the density and vigor of Mormon tea, winter fat, globe mallow, and various key antelope forage species should enhance habitat conditions for pronghorn. The improvement of the spring-summer forb component is essential to pregnant lactating does (Good, 1977). The increase of plant structure will be beneficial as cover for antelope fawns. 3,400 acres would improve due to land treatment.
	Static good: 47,191 acres	Long term Areawide Beneficial	Mod.	Grazing management would improve 9,538 acres of pronghorn habitat.
	Static fair: 876 acres	Long term Beneficial	Low	
Deferred Systems	Improving to good: 33,919 acres	Long term Beneficial	Mod.	Land treatment would improve 1,000 acres.
	Improving to fair: 1,103 acres	Long term Beneficial	Low	Grazing management would improve 32,919 acres.
	Static good: 85,497 acres	Long term Beneficial	High	
	Static fair: 2,231 acres	Long term Beneficial	Low	
	Static poor: 22,401 acres	Long term Beneficial	Mod.	
	The following allotments are two pasture deferred grazing systems:			
	Blake Pond - 8,730 ac. Clay Spring - 7,859 ac. Jackson Tank 7,228 ac. 23,817 ac.	Long term Adverse	Mod.	Two-pasture deferred systems would not provide for key antelope forage species, such as mallow, paper flower, and Bigelow sagebrush.
Less Intensive Management	Static good: 4,494 acres	Low Beneficial		Less intensive management allotments would remain in static condition. Wildlife habitat would not change.
Range Improvements				
Water	8 water developments	Long term Beneficial	Mod.	A study in Wyoming determined that antelope consume 0.09 to 1.19 gallons of water per day, depending on season, presence of succulent vegetation, maximum temperature, and other climatic conditions. The study also noted that of 12,465 antelope, 95% of the observations were within 4 miles of water. (Sundstrom, 1968). The proposed water developments would enhance antelope habitat.
Fence	15 miles	Long term Beneficial	Low	

ALTERNATIVE #1

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
PRONGHORN ANTELOPE				
Grazing				
Rest rotation	Improve to good: 3,400 acres	Long term Adverse	Low	Pronghorn habitat conditions would deteriorate under rest-rotation grazing systems. Utilization of 75% can be expected.
	Static good: 49,876 acres	Long term Adverse	Mod.	Optimum antelope habitat consists of 50% ground cover, 10-30% forbs, 40-60% grasses, and 5-20% shrubs (Alberta Recreation, Parks, and Wildlife, 1978). Under proposed rest-rotation systems, the above criteria could not be achieved, and key antelope forage species would decline in composition and vigor.
	Static fair: 7,729 acres	Long term Adverse	Low	The main conflict under alternative 1 between pronghorn and livestock would occur during spring forb greenup, when forbs are highly important to pregnant and lactating does.
Deferred Systems	Improve to good: 33,919 acres	Long term Beneficial	Mod.	Important pronghorn browse, forbs, and grasses would increase in vigor and density, as expected under the proposed action.
	Improve to fair: 1,103 acres	Long term Beneficial	Low	
	Static good: 85,497 acres	Long term Beneficial	High	
	Static fair: 2,231 acres	Long term Beneficial	Low	
	Static poor: 22,401 acres	Long term Beneficial	Mod.	
	The following allotments are two-pasture deferred:			
	Blake Pond - 8,730 ac. Clay Spring - 7,859 ac. Jackson Tank - 7,228 ac. Total 23,817 ac.	Long term Adverse	Mod.	23,187 acres of habitat would decline. Two-pasture deferred systems would not provide for key antelope forage species. The physiological needs of plants would not be met because of insufficient rest periods.
Less Intensive Management	Static good: 4,494 acres	Long term Beneficial	Low	
Range Improvements				
Water	8 water developments	Long term Beneficial	Mod.	8 water developments are expected to increase antelope distribution, increasing the use of food in formerly dewatered areas.
Fence	15 miles	Long term Adverse	Low	Additional fences (15 miles) would restrict antelope movement and potentially increase mortality from entanglement.

TABLE 3-7 (continued)

ALTERNATIVE #2

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
		PRONGHORN ANTELOPE		
Grazing				
Rest Rotation	Improve to good: 12,938 acres	Long term Beneficial	Mod.	Decreased stocking and utilization would increase the density and vigor of key antelope forage species. Antelope survival could potentially be greater under this alternative than under the proposed action. The optimum vegetative height for antelope, 5-15 inches could be attained (Alberta Recreation Parks, and Wildlife, 1978).
	Static good: 47,191 acres	Long term Beneficial	Mod.	
	Static fair: 876 acres	Long term Beneficial	Low	
Deferred Systems	Improve to good: 34,919 acres	Long term Beneficial	Mod.	Decreased stocking and utilization would increase the density and vigor of antelope forage species. Antelope fawn survival could potentially be greater under this alternative than under the proposed action.
	Improve to fair: 1,103 acres	Long term Beneficial	Low	
	Static good: 85,497 acres	Long term Beneficial	High	
	Static fair: 2,231 acres	Long term Beneficial	Low	
	Static poor:	Long term	Mod.	Allotments in poor condition would be rested for 5 years.
	22,401 acres	Beneficial		Same impacts as expected under the proposed action.
	23,817 acres (Two-pasture deferred)	Long term Adverse	Low	Key antelope forage species would decrease, since two-pasture deferred systems do not meet their physiological needs.
Less Intensive Management	Static good: 4,494 acres	Long term Beneficial	Low	Same impacts as expected under the proposed action,
Range Improvements				
Water	4 water developments	Long term Beneficial	Low	Same impacts as expected under the proposed action.
Fence	7.5 miles	Long term Adverse	Low	Same impacts as expected under the proposed action,

ALTERNATIVE #3

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
		PRONGHORN ANTELOPE		
Grazing				
Rest Rotation	Improving to good: 9,538 acres	Long term Beneficial	Low	No treatments are identified. Habitat would improve primarily through grazing systems.
	Static good: 47,191 acres	Long term Beneficial	Mod.	Same impacts as expected under the proposed action.
	Static fair: 4,276 acres	Long term Beneficial	Low	
Deferred Systems	Improve to good: 32,919 acres	Long term Beneficial	Mod.	Same impacts as expected under the proposed action,
	Improve to fair: 1,103 acres	Long term Beneficial	Low	
	Static good: 85.497 acres	Long term Beneficial	High	
	Static fair: 3,231 acres	Long term Beneficial	Low	
	Static poor: 22,401 acres	Long term Beneficial	Mod.	
	The following allotments would apply 2-pasture deferred grazing systems:			
	Blake Pond - 8,730 ac. Clay Spring 7,859 ac. Jackson Tank - 7,228 ac. Total 23,817 ac.	Long term Adverse	Mod.	23,817 acres of habitat would continue to decline.
Less Intensive Management	Static good: 4,494 acres	Long term Beneficial	Low	Same impacts as expected under the proposed action.
Range Improvements				
Water	8 water developments	Long term Beneficial	Mod.	Same impacts as expected under the proposed action.
Fence	15 miles	Long term Adverse	Low	Same impacts as expected under the proposed action.

TABLE 3-7 (continued)

ALTERNATIVE #4

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
		PRONGHORN ANTELOPE		
Grazing				
Rest Rotation	Static good: 47,191 acres	Long term Beneficial	Mod.	148,506 acres under implemented AMPs would improve. The density and vigor of browse, grasses, and forbs would respond the same as under the proposed action. Pronghorn habitat conditions would improve.
	Static fair: 12,815 acres	Long term Beneficial	Mod.	
Deferred Systems	Improve to good: 27,420 acres	Long term Beneficial	Mod.	
	Improve to fair: 1,103 acres	Long term Beneficial	Low	
	Static good: 85,497 acres	Long term Beneficial	High	
	Static fair: 6,500 acres	Long term Beneficial	Low	
	Static poor: 24,631 acres	Long term Beneficial	Mod.	
	63,475 acres would decline (non-AMP acres)	Long term Adverse	Mod.	Utilization would exceed 50% within these allotments. Key antelope forage species would decrease in abundance and vigor. Livestock use forbs and browse extensively on many allotments in the ES area, especially on ranges with poor grass components.
	15,539 acres would decline (AMPs) (two-pasture deferred system).	Long term Adverse	Mod.	Although allotments are currently under AMPs, key antelope forage species would decline under two-pasture deferred systems.
Less Intensive Management	Static good: 4,494 acres*	Long term Adverse	Low	Utilization would exceed 50% within these allotments. Key antelope forage species would decrease in abundance and vigor.
	4,494 acres would decline			
Range Improvements				
Water	7 water developments	Long term Beneficial	Mod.	Same impacts as expected under the proposed action.
Fence	6 miles	Long term Adverse	Low	Same impacts as expected under the proposed action.

TABLE 3-7 (continued)

PROPOSED ACTION

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
		BIGHORN SHEEP		
Grazing				
Rest Rotation	Improving to good: 3,873 acres	Long term Beneficial	Low	Livestock competition would decrease, and forbs, grass, and browse would increase.
	Static good: 1,289 acres	Long term Beneficial	Low	Vigor and density would improve bighorn sheep habitat over current conditions. Whether the proposed action would actually increase bighorn reproductive success is unknown. Climax forage conditions are not expected to be attained.
	Static fair: 2,170 acres	Long term Beneficial	Low	
	Static poor: 71,461 acres	Long term Beneficial	Mod.	
	Unsuitable: 37,366 acres	Long term Beneficial	Mod.	
Deferred Systems	Improve to good: 14,516 acres	Long term Beneficial	Mod.	Bighorn forage would increase, but cattle would still heavily graze canyon bottoms on applicable allotments.
	Static fair: 2,130 acres	Long term Beneficial	Low	
	Static poor: 190 acres	Long term Beneficial	Low	
	Unsuitable: 1,213 acres	Long term Beneficial	Low	No impact.
	Declining two-pasture deferred systems:			
	Cedar Wash - 4,107 ac. Dripping Spring - 1,254 ac. Lambing - 3,430 ac. Total 8,791 ac.	Long term Adverse	Low	8,791 acres of bighorn habitat would be managed under two-pasture deferred systems. Browse, forbs, and cool- and warm-season grasses would decrease in abundance and vigor, and overall sheep habitat conditions would deteriorate.
Less Intensive	11,213 acres would decline	Long term Adverse		Bighorn sheep habitats are not expected to improve under less intensive management. Overall habitat conditions would decline, and key bighorn forage species would decrease in vigor and abundance.
Range Improvements				
Water	6 water developments	Long term Beneficial	Mod.	Bighorn sheep habitats have poor water distribution. Six additional water developments would potentially increase sheep use of these dewatered areas. Yet the expected overused area around the water is potentially dangerous to bighorn.
Fence	11 miles	Long term Adverse	Low	Bighorn sheep, especially lambs, would have difficulty crossing the 11 additional miles of fence. The extent of sheep mortality is unknown.

ALTERNATIVE #1

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
		BIGHORN SHEEP		
Grazing				
Rest Rotation	Static good: 12,189 acres	Long term Adverse	Low	Excessive utilization (75%) would degrade bighorn sheep habitats. Bighorn-livestock competition would increase, decreasing vigor and abundance of key bighorn forage species. Studies show that cattle use the more important food plants preferred by bighorn (Russo, 1956). According to Hansen and Martin (1973), cattle and bighorn sheep diets in Mohave County overlap significantly. They determined that the annual livestock diet was 83 percent and the annual bighorn diet was 87 percent of the five major plants found in their diets: fluffgrass, Mormon tea, globemallow, bush muhly, and catclaw.
	Static fair: 6,043 acres	Long term Adverse	Low	
	Static poor: 70,391 acres	Long term Adverse	Mod.	
	Unsuitable: 38,346 acres	Long term Beneficial	Mod.	No impact.
Deferred Systems	Improving to good: 10,409 acres	Long term Beneficial	Mod.	Deferred systems should increase the availability of bighorn forage but not increase bighorn reproduction.
	Static fair: 6,237 acres			
	Static poor: 190 acres	Long term Beneficial	Low	Livestock would overgraze canyon habitats in many allotments.
	Unsuitable: 8,277 acres	Long term Beneficial	Low	No impact.
	Declining two-pasture deferred systems:			
	Cedar Wash - 4,107 ac. Dripping Spring - 1,254 ac. Lambing - 3,430 ac. Total 8,791 ac.	Long term Adverse	Low	8,791 acres of bighorn habitat would be managed under two-pasture deferred systems. Browse, forbs, and cool- and warm-season grasses would decrease in abundance and vigor, and overall sheep habitat conditions would deteriorate.
Less Intensive Management	Static fair: 9,677 acres	Long term Beneficial	Low	
	Static poor: 323 acres	Long term Beneficial	Low	
	Unsuitable: 1,213 acres	Long term Beneficial	Low	No impact.
	11,213 acres would decline	Long term Adverse	Mod.	Allotments proposed for less intensive management (11,213 acres) would not appreciably benefit bighorn sheep habitat, allowing habitat conditions to remain unsatisfactory.
Range Improvements				
Water	6 water developments	Long term Beneficial	Low	Same impact as expected under the proposed action.
Fences	9 miles	Long term Adverse	Low	Same impact as expected under the proposed action.

TABLE 3-7 (continued)

ALTERNATIVE #4

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
BIGHORN SHEEP				
Grazing				
Rest Rotation	Improving to good: 358 acres	Long term Beneficial	Low	Key forage species would increase on 14,486 acres of bighorn sheep habitat (AMP allotments), and the abundance and vigor of browse, forbs, and grasses are expected to increase. Bighorn sheep populations would remain static.
	Static good: 1,289 acres	Long term Beneficial	Low	
	Static fair: 5,690 acres	Long term Beneficial	Low	
	Static poor: 61,706 acres	Long term Beneficial	Mod.	
	Unsuitable: 30,408 acres	Long term Beneficial	Mod.	No impact.
Deferred Systems	Static fair: 9,341 acres	Long term Beneficial	Low	
	Static poor: 7,305 acres	Long term Beneficial	Low	
	Unsuitable: 7,100 acres	Long term Beneficial	Low	No impact.
	Two-pasture deferred systems declining:			
	Cedar Wash - 4,107 ac. Dripping Spring - 1,254 ac. Lambing - 3,400 ac. Total 8,791 ac.	Long term Adverse	Low	Same impacts as expected under the proposed action.
	108,299 acres declining (non-AMP acres)	Long term Adverse	High	Key bighorn forage would decline in density and vigor. Utilization on non-AMP allotments could exceed acceptable levels. No set season of use would be applied to these allotments. Sheep numbers would continue to decline. Although no diet information exists for this area (Sanup Plateau), yearlong grazing and excessive utilization are suspected to have depressed sheep populations. Studies have shown that bighorn sheep will not stay in an area heavily used by other ungulates (Welles and Welles, 1961 and Wilson, 1968). Bighorn sheep depend highly on climax plant communities in good to excellent condition and probably cannot coexist with livestock on intensively grazed ranges.

ALTERNATIVE #4

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
BIGHORN SHEEP				
Grazing				
Less Intensive Management	Static fair: 9,677 acres	Long term Beneficial	Low	
	Static poor: 323 acres	Long term Beneficial	Low	
	Unsuitable: 1,213 acres	Long term Beneficial	Low	No impact.
	11,213 acres would decline	Long Term Adverse	Mod.	Same impacts as expected under the proposed action.
Water	7 water developments	Long term Beneficial	Mod.	Same impacts as expected under the proposed action.
Fence	1/2 mile	Long term Adverse	Low	Same impacts as expected under the proposed action.

TABLE 3-7 (continued)

ALTERNATIVE #2

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
		BIGHORN SHEEP		
Grazing				
Rest Rotation	Improving to good: 3,873 acres	Long term Beneficial	Low	Bighorn sheep habitats are projected to improve faster than they would under the proposed action.
	Static good: 1,289 acres	Long term Beneficial	Low	Reduced stocking and utilization would more quickly increase the abundance and vigor of browse, forbs, and grasses. This alternative would probably not prompt bighorns to expand into former historical ranges. Climax or historical habitat conditions are not expected to return.
	Static fair: 2,170 acres	Long term Beneficial	Low	
	Static poor: 70,391 acres	Long term Beneficial	Mod.	Allotments in poor condition would be deferred from grazing for 5 years (short-term benefit).
	Unsuitable: 38,493 acres	Long term Beneficial	Mod.	No impact.
Deferred Systems	Improve to good: 14,516 acres	Long term Beneficial	Mod.	Key bighorn forage species are projected to increase. Same impacts as expected under the proposed action.
	Static fair: 2,130 acres	Long term Beneficial	Low	
	Static poor: 190 acres	Long term Beneficial	Low	Grazing on allotments in poor condition would be deferred for 5 years (short-term benefit).
	Unsuitable: 8,277 acres	Long term Beneficial	Low	No impact.
	2-pasture deferred systems declining: Cedar Wash - 4,107 ac. Dripping Spring - 1,254 ac. Lambing - 3,430 ac. Total 8,791 ac.	Long term Adverse	Low	Same impacts as expected under the proposed action.
Less Intensive Management	Static fair: 9,677 acres	Long term Beneficial	Low	Same impacts as expected under the proposed action.
	Static poor: 323 acres	Long term Beneficial	Low	
	Unsuitable: 1,213 acres	Long term Beneficial	Low	
	11,213 acres will decline			
Range Improvements				
Water	3 water developments	Long term Beneficial	Low	Same impacts as expected under the proposed action.
Fence	4.5 miles	Long term Adverse	Low	Same impacts as expected under the proposed action.

ALTERNATIVE #3

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
		BIGHORN SHEEP		
Grazing				
Rest Rotation	Improve to good: 3,079 acres	Long term Beneficial	Low	Same impacts as expected under the proposed action.
	Static good: 1,289 acres	Long term Beneficial	Low	
	Static fair: 2,964 acres	Long term Beneficial	Low	
	Static poor: 70,391 acres	Long term Beneficial	Mod.	
	Unsuitable: 38,436 acres	Long term Beneficial	Mod.	No impact.
Deferred Systems	Improve to good: 7,211 acres	Long term Beneficial	Low	Same impacts as expected under the proposed action.
	Static fair: 2,130 acres	Long term Beneficial	Low	
	Static poor: 7,495 acres	Long term Beneficial	Low	
	Unsuitable: 8,277 acres	Long term Beneficial	Low	No impact.
	Two-pasture deferred systems declining: Cedar Wash - 4,107 ac. Dripping Spring - 1,254 ac. Lambing - 3,430 ac. Total 8,791 ac.	Long term Adverse	Low	Same impacts as expected under the proposed action.
Less Intensive Management	Static fair: 9,677 acres	Long term Beneficial	Low	
	Static poor: 323 acres	Long term Beneficial	Low	
	Unsuitable: 1,213 acres	Long term Beneficial	Low	No impact.
	11,213 acres will decline	Long term Adverse	Mod.	Same impacts as expected under the proposed action.
Range Improvements				
Water	6 water developments	Long term Beneficial	Low	Same impacts as expected under the proposed action.
Fence	9 miles	Long term Adverse	Low	Same impacts as expected under the proposed action.

TABLE 3-7 (continued)

PROPOSED ACTION

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
NONGAME Small/Upland Game, Birds of Prey, Small Mammals, Nongame Birds, Carnivores, Reptiles, Amphibians and Fish				
Grazing				
Rest Rotation	Improving to good: 76,081 acres	Long term Beneficial	High	Rest-rotation grazing systems generally enhance habitat components for most groups of wildlife: nongame birds, small mammals, birds of prey, carnivores, small and upland game, and reptiles and amphibians.
	Improving to fair: 42,265 acres	Long term Beneficial	Mod.	
	*Declining to poor: 78,100 acres	Long term Beneficial	Mod.	The expected increase in the diversity and density of food and cover would upgrade present habitat. Cover is extremely important for some small mammals, especially cottontails.
	Static fair: 293,119 acres poor:	Long term Beneficial	High	
	Static poor 561,522 acres	Long term Beneficial	High	For nongame birds, moderately grazed areas whose vegetation composition and density of habitats have not been significantly changed are similar to ungrazed areas (Wiens, 1973). *124,610 acres of treatment are projected to decrease the diversity of nongame birds and small mammals. Densities of certain species such as deer mice would increase in treated areas. The pinyon-juniper woodland would be the community most dramatically affected. Small- and upland game species (desert cottontail and Gambel's quail) are expected to benefit from land treatments as long as adequate cover is maintained.
Deferred Systems	Improving to good: 62,163	Long term Beneficial	Mod.	Key habitat components would improve under rest rotation. Increases in density and diversity in the shrub and herbaceous layers should improve habitat. The reproduction rate of most small mammals is directly related to the availability of forbs before and during reproduction (Reynolds, 1960).
	Improving to fair: 1,103 acres	Long term Beneficial	Low	
	*Declining to poor: 34,810 acres	Long term Adverse	Mod.	*Nongame birds and small mammals are projected to decrease in diversity as a result of land treatment. Density of cover limits population growth (Wright, 1973).
	Static good: 120,181 acres	Long term Beneficial	High	
	Static fair: 24,601 acres	Long term Beneficial	Mod.	
	Static poor: 24,601 acres	Long term Beneficial	High	

*Land treatment

PROPOSED ACTION

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
NONGAME Small/Upland Game, Birds of Prey, Small Mammals, Nongame Birds, Carnivores, Reptiles, Amphibians and Fish				
Grazing				
Deferred Systems (cont.)	All two-pasture deferred systems will decline: 149,114 acres	Long term Adverse	High	149,114 acres of habitat are expected to decline under two-pasture deferred grazing systems. The diversity and density of browse, forbs, and grasses would decrease. Small-mammal species diversity increases with increased structural complexity of the habitat (Rosenzweig and Winakur, 1969). Key wildlife habitat components would deteriorate.
Less Intensive Management	Improving to good: 5,455 acres	Long term Beneficial	Low	Habitat conditions on less intensively managed allotments would essentially remain static.
	Improving to fair: 2,896 acres	Long term Beneficial	Low	Utilization will be monitored and will average 50%.
	Static good: 22,751 acres	Long term Beneficial	Mod.	
	Static fair: 39,342 acres	Long term Beneficial	Mod.	
	Static poor: 30,737 acres	Long term Beneficial	Mod.	
Range Improvements				
Water	86 water developments	Long term Beneficial	High	A certain number of earthen stock tanks would be fenced to improve waterfowl and shorebird habitats. Shoreline vegetation would increase and enhance food and cover components of reservoirs. The remaining unfenced reservoirs would provide resting habitat for migrant waterfowl and shorebirds. Increased water distribution would increase the range of terrestrial species, such as bats, carnivores, small- and upland game, and amphibians. Studies show that Gambel's quail stay within 1.5 miles of water (Johnsgard, 1973). Similarly, water development would increase the area's suitability for bats (Brown, 1978). Many bat species are not well adapted to conserve water (Geluso, 1978).
	10,750 acres of habitat (sacrifice areas)			Water developments constructed in areas lightly grazed by livestock in the past would adversely impact nongame species that do not require water, especially next to sacrifice areas. Even though livestock pressure might be relieved in other areas, the degree of competition for food and cover would still be greater on previously unwatered areas. Small mammals, reptiles, amphibians, and nongame birds would decrease in abundance.

TABLE 3-7 (continued)

PROPOSED ACTION

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
NONGAME Small/Upland Game, Birds of Prey, Small Mammals, Nongame Birds, Carnivores, Reptiles, Amphibians and Fish				
Range Improvements				
Water (cont.)				Overgrazing around waters would adversely affect habitat of sedentary wildlife and small mammals.
	10,750 acres sacrifice area Decline in habitat condition	Long term Adverse	Mod.	Poor cover and food conditions would increase the susceptibility to predation of water dependent and nonwater-dependent wildlife. Small- and upland game species may not benefit from increased water distribution if areas around new waters lack adequate cover.
Wet Meadow, Riparian, and Aquatic Habitats				
Fence	137 miles	Long term Beneficial	Mod.	Additional fences should slightly benefit nongame animals, especially in open habitats. Birds of prey use fenceposts as hunting perches, and song birds use posts as singing perches. Occasionally, brush accumulates along fence rows, providing cover and food for various wildlife.
Fenced Springs	42 miles of riparian habitat	Long term Beneficial	High	Fenced springs would upgrade habitat for all associated wildlife species. These extremely productive systems are predicted to improve habitat for reptiles and amphibians, carnivores, small and upland game, nongame birds, and small mammals, including bats. The vigor and density of phreatophytic and herbaceous species would increase dramatically.
Unfenced springs	Unknown	Long term Adverse	High	Many unfenced springs and riparian habitats would continue to deteriorate. Poor seedling survival of cot-
Riparian habitat	42 miles of riparian habitat (Virgin River, Beaver Dam Wash)	Long term Adverse	High	tonwood and willow would prevent replacement of old trees. The vigor and density of herbaceous species (rushes and sedges) are expected to decrease. Overall habitat conditions for nongame wildlife would be unsatisfactory.
Aquatic habitat	Virgin River Beaver Dam Wash	Long term Adverse	Unknown	The extent of livestock grazing impacts on aquatic habitat is unknown. A reduction in vegetation structure and density would reduce terrestrial and aquatic insect populations of the riparian zones, reducing the food supply of desert fishes within the Virgin River ecosystem (Deacon, 1979).

ALTERNATIVE #1

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
NONGAME Small/Upland Game, Birds of Prey, Small Mammals, Nongame Birds, Carnivores, Reptiles, Amphibians and Fish				
Grazing				
Rest Rotation	Improving to good: 7,183 acres	Long term Adverse	Low	Utilization on 680,177 acres of habitat would reach or exceed 75% under rest-rotation grazing, adversely impacting wildlife inhabiting high-utilization pastures. Nesting habitat for nongame birds would decrease, and cover conditions would worsen for reptiles and amphibians, small mammals (bats), and small- and upland game species.
	Declining to fair: 7,504 acres	Long term Adverse	Low	Livestock grazing affects lizard species in varying ways, depending on species and livestock grazing pressure. According to Jones (1979), overgrazing primarily affects the existing vegetation by reducing the low-height vegetation percentages and percent cover. The loss of low-height vegetation and cover therefore reduces the densities of whiptail lizards, zebra-tailed lizards, leopard lizards, and horned lizards.
	Declining to poor: 69,150 acres	Long term Adverse	Low	The overall effects on nongame bird populations is difficult to assess, primarily because of varying livestock utilization. High utilization (greater than an average of 50 percent) of forbs, grasses, and shrubs in the ES area reduces annual arthropod and seed production, affecting to
	Static good: 121,746 acres	Long term Adverse	High	an unknown extent the food source of granivorous and insectivorous nongame birds. Grazing that markedly changes vegetation was found to be accompanied by major composition shifts in 19 communities, generally toward closer resemblance to 10 communities in drier habitats (Wiens and Dyer, 1975).
	Static fair: 364,279 acres	Long term Adverse	High	Areas contain 0 to 14% key (poor range conditon) livestock forage species. No improvement in range condition is expected.
	Static poor: 604,491 acres	Long term Adverse	High	Areas contain 0 to 14% key (poor range condition) livestock forage species. No improvement in range condition is expected. Rest rotation under this alternative would have the same impacts on these acres as it would under the proposed action.
Deferred System	Improving to good: 52,795 acres	Long term Beneficial	Mod.	
	Improving to fair: 1,103 acres	Long term Beneficial	Low	

TABLE 3-7 (continued)

ALTERNATIVE #1

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
NONGAME Small/Upland Game, Birds of Prey, Small Mammals, Nongame Birds, Carnivores, Reptiles, Amphibians and Fish				
Grazing				
Deferred System (cont.)	*Declining to poor: 34,810 acres	Long term Adverse	Mod.	Same impacts as expected under the proposed action (land treatment).
	Static good: 120,181 acres	Long term Beneficial	High	
	Static fair: 33,969 acres	Long term Beneficial	Mod.	
	Static poor: 173,148 acres	Long term Beneficial	High	
	All two-pasture deferred systems will decline:			
	149,114 acres	Long term Adverse	High	Same impacts as expected under the proposed action.
Less Intensive Management	Static good: 22,751 acres	Long term Beneficial	Mod.	Same impacts as expected under the proposed action.
	Static fair: 42,697 acres	Long term Beneficial	Mod.	
	Static poor: 35,463 acres	Long term Beneficial	Mod.	
Range Improvements				
Water	86 water developments	Long term Beneficial	High	Alternative I would have the same impacts as the proposed action for fenced and unfenced reservoirs, springs, catchments, and riparian habitats.
	10,750 acres sacrifice area	Long term Adverse	High	58 water developments are projected to be constructed in allotments under rest-rotation grazing. Sacrifice areas within these allotments would be slightly larger due to higher utilization. Impacts would be essentially the same as under the proposed action but would occur over a larger area.
Fence	137 miles	Long term Beneficial	Mod.	Same impacts as expected under the proposed action.
Wet Meadow, Riparian, and Aquatic Habitat				
Fenced springs			Low	Same impacts as expected under the proposed action.
Unfenced springs and riparian habitats	42 miles riparian habitat		High	Same impacts as expected under the proposed action, but spring and riparian habitats on rest-rotation allotments would deteriorate faster due to higher utilization.
Aquatic habitat	Virgin River Beaver Dam Wash		Unknown	Same impacts as expected under the proposed action.

ALTERNATIVE #2

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
NONGAME Small/Upland Game, Birds of Prey, Small Mammals, Nongame Birds, Carnivores, Reptiles, Amphibians and Fish				
Grazing				
Rest Rotation	Improving to good: 78,468 acres	Long term Beneficial	High	Under this alternative rest-rotation systems would upgrade existing habitat conditions faster than under the proposed action. Nongame bird nesting habitat and food and cover for amphibians, reptiles, small mammals (bats), small- and upland game species, carnivores, and birds of prey would improve through reduced stocking and utilization.
	Improving to fair: 44,495 acres	Long term Beneficial	Mod.	
	Declining to fair: 4,602 acres	Long term Adverse	Low	Allotments in poor range condition would be rested for 5 years (short-term benefit).
	*Declining to poor: 72,116	Long term Adverse	Mod.	Same impacts as expected under the proposed action, but slightly lower utilization is expected.
	Static good: 124,648 acres	Long term Beneficial	High	
	Static fair: 291,203 acres	Long term Beneficial	High	
	Static poor: 558,821 acres	Long term Beneficial	High	
Deferred System	Improving to good: 62,163 acres	Long term Beneficial	Mod.	Same improvement in wildlife habitat conditions is expected as under rest-rotation systems, but at a slower rate.
	Improving to fair: 1,103 acres	Long term Beneficial	Low	
	*Declining to poor: 34,810 acres	Long term Adverse	Mod.	Same impacts as expected under the proposed action except with a slightly lower utilization.
	Static good: 120,181 acres	Long term Beneficial	High	
	Static fair: 24,601 acres	Long term Beneficial	Mod.	
	Static poor: 173,148 acres	Long term Beneficial	High	
	All two-pasture deferred systems would decline: 149,114 acres	Long term Adverse	High	Habitat conditions within allotments would decline as expected under the proposed action. Lower stocking and utilization would reduce the rate of key forage species decline.

*Land treatment

TABLE 3-7 (continued)

ALTERNATIVE #3

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
NONGAME Small/Upland Game, Birds of Prey, Small Mammals, Nongame Birds, Carnivores, Reptiles, Amphibians and Fish				
Range Improvements				
Water	86 water developments	Long term Beneficial	High	Same impacts as expected under the proposed action.
	10,750 acres sacrifice area	Long term Adverse	High	Same impacts as expected under the proposed action.
Fence	137 miles	Long term Minimal	Low	Same impacts as expected under the proposed action.
Wet Meadow, Riparian, and Aquatic Habitat				
Fenced Springs	Unknown	Long term Beneficial	High	Fenced springs would upgrade habitat for all associated wildlife species. These extremely productive systems are predicted to improve habitat conditions for reptiles and amphibians, carnivores, small and upland game, nongame birds, and small mammals, including bats. The vigor and density of phreatophytic and herbaceous species would increase dramatically.
Unfenced springs	Unknown	Long term Adverse	High	Many unfenced springs and riparian habitats would continue to deteriorate. Poor seedling survival of cottonwood and willow would prevent replacement of old trees.
Riparian habitat	42 miles of riparian habitat (Virgin River, Beaver Dam Wash)	Long term Adverse	High	The vigor and density of herbaceous species (rushes and sedges) are expected to decrease.
Riparian Habitat (cont.)				Overall habitat conditions for nongame wildlife would be unsatisfactory.
Aquatic habitat	Virgin River Beaver Dam Wash	Long term Adverse	Unknown	The extent of livestock grazing impacts on aquatic habitat is unknown. A reduction in vegetation structure and density would reduce terrestrial and aquatic insect populations of the riparian zones, reducing the food supply of desert fishes within the Virgin River ecosystem (Deacon, 1979).

ALTERNATIVE #4

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
NONGAME Small/Upland Game, Birds of Prey, Small Mammals, Nongame Birds, Carnivores, Reptiles, Amphibians and Fish				
Grazing				
Rest Rotation and Deferred AMPs	Improving to good: 30,570 acres	Long term Beneficial	Mod.	The impacts to wildlife habitat as addressed under the proposed action would be essentially the same for allotments under implemented AMPs (599,717 acres).
	Improving to fair: 1,103 acres	Long term Beneficial	High	Approximately 1,248,876 acres of habitat (non-AMP allotments) are projected to remain in unsatisfactory condition. Heavy utilization and erratic use periods would reduce wildlife food and cover for nongame birds, amphibians and reptiles, small game and upland game, and small mammals (including bats). Busack and Bury (1974) came to similar conclusions in their study that compared lizard populations on grazed and ungrazed sheep ranges. The ungrazed plot had twice the number of lizards and three times the biomass of the grazed plot. They determined that direct casualties, degradation of invertebrates, loss of social structure, and loss of cover lowered lizard biomass on the grazed plot. Habitat with increased plant structures (expressed as plant species diversity and plant volume density) support more lizard species than those with fewer plant structures (Pianka, 1967). A study conducted in Lonesome Valley, (Coombs and Middlebrook, 1976), however compared a lightly grazed area to a moderately grazed area and concluded that the lightly grazed habitat contained twice as many small mammals after 1,179 trap nights. At this same study site, arthropods were 1.58 times more abundant and had a species density 1.13 times greater on the lightly grazed side than on the moderately grazed side. Although the Lonesome Valley study was brief, it identified the need to determine the beneficial or adverse influence of domestic livestock at various biotic levels. Moreover, Black and Frischknect (1971) showed that deer mice were most abundant in heavily grazed areas with relatively light cover, and Great Basin pocket mice and western harvest mice were less numerous in heavily grazed sagebrush areas in Utah. Allotments that consistently experience high utilization levels (less than 68%) and show a marked reduction in food and cover resources probably support relatively fewer number of species than comparable areas in good vegetation condition.

TABLE 3-7 (continued)

ALTERNATIVE #4

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
NONGAME Small/Upland Game, Birds of Prey, Small Mammals, Nongame Birds, Carnivores, Reptiles, Amphibians and Fish				
Grazing				
Rest Rotation and Deferred AMPs (cont.)	Static poor: 184,516 acres	Long term Beneficial	Low	
	Decline to poor: 28,410 acres	Long term Adverse	High	Same impacts as expected under the proposed action.
	Static good: 190,098 acres	Long term Beneficial	High	
	Static fair: 111,106 acres	Long term Beneficial	Mod.	
	Static poor: 184,516 acres	Long term Beneficial	Low	
	Two-pasture deferred systems:			
	Beaver Dam Slope- 36,088 ac. Clay Spring - 12,003 ac. Jackson Tank - 7,817 ac.	Long term Adverse	High	Same impacts as expected under the proposed action.
Less Intensive Management	Improving to good: 11,220 acres	Long term Beneficial	High	Approximately 1,248,876 acres of habitat on non-AMP allotments would remain in unsatisfactory condition.
	Static good: 73,303 acres	Long term Beneficial	Mod.	Heavy utilization and erratic use periods would reduce wildlife food and cover.
	Static fair: 357,750 acres	Long term Beneficial	High	
				The diversity and density of vegetation affect the distribution, composition, and numbers of arthropods within the ES area. Improper livestock grazing decreases vegetation cover and indirectly reduces arthropod populations. Grazing thus plays a major role in the population ecology of arthropods and indirectly impacts associated bat faunas. BLM (1978b) recently conducted an insect study for the Upper Gila-San Simon Grazing Environmental Statement, which showed that insect populations and diversities were greater in livestock exclosures than in grazed areas. Various allotments in the ES area are grazed by livestock, which extensively use vegetation cover, especially in canyons or bottoms.
	Decline to poor: 28,410 acres	Long term Adverse	High	Same impacts as expected under the proposed action.
	Static good: 190,098 acres	Long term Beneficial	High	
	Static fair: 111,106 acres	Long term Beneficial	Mod.	

ALTERNATIVE #4

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
NONGAME Small/Upland Game, Birds of Prey, Small Mammals, Nongame Birds, Carnivores, Reptiles, Amphibians and Fish				
Range Improvements				
Water	18 water developments Beneficial	Long term	Low	Same impacts as expected under the proposed action.
	2,250 acres of sacrifice area	Long term Adverse	Low	Same impacts as expected under the proposed action, except overgrazed areas would be slightly smaller in total area under the proposed action.
Fence	7.7 miles	Long term Minimal	Low	Same impacts as expected under the proposed action.
Fenced Springs	42 miles of riparian habitat	Long term Beneficial	High	Fenced springs would upgrade habitat for all associated wildlife species. These extremely productive systems are predicted to improve habitat conditions for reptiles and amphibians, carnivores, small and upland game, nongame birds, and small mammals including bats. The vigor and density of phreatophytic and herbaceous species would increase dramatically.
Unfenced springs	Unknown	Long term Adverse	High	Many unfenced springs and riparian habitats would continue to deteriorate.
Riparian habitat	42 miles of riparian habitat (Virgin River, Beaver Dam Wash)	Long term Adverse	High	Poor seedling survival of cottonwood and willow would prevent replacement of old trees. The vigor and density of herbaceous species (rushes and sedges) are expected to decrease. Overall habitat conditions for nongame wildlife would be unsatisfactory.
Aquatic habitat	Virgin River Beaver Dam Wash	Long term Adverse	Unknown	The extent of livestock grazing impacts on aquatic habitat is unknown. A reduction in vegetation structure and density would reduce terrestrial and aquatic insect populations of the riparian zones, reducing the food supply of desert fishes within the Virgin River ecosystem (Deacon, 1979).

TABLE 3-7 (continued)

ALTERNATIVE #2

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
NONGAME Small/Upland Game, Birds of Prey, Small Mammals, Nongame Birds, Carnivores, Reptiles, Amphibians and Fish				
Grazing				
Less Intensive Management	Improving to good: 6,235 acres	Long term Beneficial	Low	Same impacts as expected under the proposed action. Habitat condition might improve somewhat on allotments deferred for 5 years or with reduced stocking levels.
	Improving to fair: 2,896 acres	Long term Beneficial	Low	
	Static good: 22,751 acres	Long term Beneficial	Mod.	
	Static fair: 38,562 acres	Long term Beneficial	Mod.	Area contains 15 to 39 percent key livestock forage species. No improvement in range condition expected.
	Static poor: 30,737 acres	Long term Beneficial	Mod.	Area contains 0 to 14 percent key livestock forage species. No improvement in range condition expected.
Range Improvements				
Water	43 water developments	Long term Beneficial	Mod.	Same impacts as expected under the proposed action.
	5,375 acres sacrifice area	Long term Adverse	Mod.	Impacts would be the same as under the proposed action but they would occur over a smaller area. (5-year deferment, short-term benefits.)
Fence	65 miles	Long term Minimal	Low	Same impacts as expected under the proposed action.
Wet Meadow, Rioarian, and Aquatic Habitat				
Fenced Springs Habitats	Unknown	Long term Beneficial	High	Same impacts as expected under the proposed action.
Unfenced Springs and Riparian Habitats	Unknown 42 miles of riparian habitat	Long term Adverse	High	Springs and riparian habitats on allotments deferred for 5 years would improve significantly, and most wildlife would benefit in the short term (5 years). Once livestock grazing is returned (end of 5-year period), habitats would deteriorate to their former condition. Lighter livestock grazing pressure could slightly improve the vigor of herbaceous species but would defer the regeneration of woody phreatophytes. Impacts to the various groups of wildlife would essentially remain the same.
Aquatic habitat	Virgin River Beaver Dam Wash	Long term Adverse	Adverse	Same impacts as expected under the proposed action.

ALTERNATIVE #3

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
NONGAME Small/Upland Game, Birds of Prey, Small Mammals, Nongame Birds, Carnivores, Reptiles, Amphibians and Fish				
Grazing				
Rest Rotation	Improving to good: 76,081 acres	Long term Beneficial	High	Same impacts as expected under the proposed action, except no land would be treated.
	Improving to fair: 42,265 acres	Long term Beneficial	Mod.	
	Static good: 129,250 acres	Long term Beneficial	High	Nongame birds and small mammals would maintain their diversity, and populations would remain unaltered. Abundance of small- and upland game species and densities of certain small mammals, reptiles, and amphibians would not increase, and carnivores and birds of prey would not benefit from increased densities of prey species.
	Static fair: 331,915 acres	Long term Beneficial	High	
	Static poor: 594,842 acres	Long term Beneficial	High	
Deferred System	Improving to good: 62,163 acres	Long term Beneficial	Mod.	Same impacts as predicted for rest rotation under the proposed action and alternative 2.
	Improving to fair: 1,103 acres	Long term Beneficial	Low	
	Static good: 120,181 acres	Long term Beneficial	High	
	Static fair: 25,601 acres	Long term Beneficial	Mod.	Area contains 15 to 39% key livestock forage species. No improvement in range condition expected.
	Static poor: 206,958 acres	Long term Beneficial	High	Area contains 0 to 14% key livestock forage species. No improvement in range condition expected.
	All two-pasture deferred systems will decline:			
	149,114 acres	Long term Adverse	High	Same impacts as expected under the proposed action.
Less Intensive Management	Improving to good: 5,455 acres	Long term Beneficial	Low	Same impacts as expected under the proposed action.
	Improving to fair: 2,896 acres	Long term Beneficial	Low	
	Static good: 22,751 acres	Long term Beneficial	Mod.	
	Static fair: 30,737 acres	Long term Beneficial	Mod.	

TABLE 3-7 (continued)

PROPOSED ACTION

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
		TORTOISE		
Grazing				
Rest Rotation	Improving to good: 1,422 acres	Long term Beneficial	Low	Rest-rotation systems applied at 50% utilization of both perennial and ephemeral vegetation would upgrade present desert tortoise habitat.
	Improving to fair: 3,180 acres	Long term Beneficial	Low	
	Static good: 3,025 acres	Long term Beneficial	Low	Forbs and perennial grasses would increase in abundance.
				Desert tortoise denning areas would be deferred from spring and summer grazing or fenced to prevent excessive tortoise-livestock competition.
	Static fair: 18,120 acres	Long term Beneficial	High	
	Static poor: 97,099 acres	Long term Beneficial	High	
Deferred Systems	Improving to good: 589 acres	Long term Beneficial	Low	Deferred systems (three pasture) would increase production of key tortoise forage species.
	Static good: 2,016 acres	Long term Beneficial	Low	
	Static poor: 42,895 acres	Long term Beneficial	High	
	The following two-pasture deferred systems will decline:			34,816 acres of desert tortoise habitat would be adversely impacted (excluding concentration areas). Forbs and perennial grasses would decrease in abundance and vigor. Desert tortoise populations would decline under two-pasture deferred systems.
	Beaver Dam Slope: 34,227 ac. Cedar Wash: 589 ac. Total 34,816 ac.	Long term Adverse	High	
Less Intensive Management	Static fair: 8,943 acres	Long term Beneficial	Mod.	Area contains 15 to 39% key livestock forage species. No improvement in range condition expected.
	Static poor: 21,656 acres	Long term Beneficial	High	Area contains 0 to 14% key livestock forage species. No improvement in range condition expected.
	*30,599 acres will decline	Long term Adverse	High	30,599 acres of habitat under less intensive management would decline. Less intensive management would not meet the needs of key desert tortoise forage species.
Range Improvements				
Water	7 water developments	Long term Minimal	Low	Habitat surrounding livestock waters would remain in unsatisfactory condition (Water development would be at least 1 mile from concentration areas.) Excessive utilization around concentration areas would require their fencing or deferral from grazing in the spring and summer.
	875 acres sacrifice area 125 acres/development	Long term Adverse		

*Included in above acreages

ALTERNATIVE #1

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
		TORTOISE		
Grazing				
Rest Rotation	Static good: 3,025 acres	Long term Adverse	Low	Approximately 97,502 acres of tortoise habitat would decline under rest-rotation grazing systems. Utilization on allotments would reach 75%, adversely impacting desert tortoises. Decline in density and vigor of forbs and perennial grasses would be greater than under the proposed action.
	Static fair: 19,542 acres	Long term Adverse	High	Domestic livestock compete vigorously with tortoises for ephemeral and perennial vegetation during the spring and summer. Livestock utilization exceeding an average of 50 percent on perennial or ephemeral vegetation adversely impacts tortoises.
	Static poor: 100,279 acres	Long term Adverse	High	
	Highway: 7,936 Littlefield Comm: 29,849 Mesquite Comm: 16,205 Mosby-Nay: 10,521 Tassi 32,991 97,502*			
Deferred System	Static good: 2,016 acres	Long term Beneficial	Low	Same impacts as expected under the the proposed action.
	Static fair: 589 acres	Long term Beneficial	Low	
	Static poor: 42,895 acres	Long term Beneficial	High	
	Habitat under the following two-pasture deferred systems would decline:			
	Beaver Dam Slope: 34,227 ac. Cedar Wash: 589 ac. Total 34,816 ac.	Long term Adverse	High	Same impacts as expected under the proposed action.
Less Intensive Management	Static fair: 8,943 acres	Long term Beneficial	Mod.	Same impacts as expected under the proposed action.
	Static poor: 21,656 acres	Long term Beneficial	High	
	30,599 acres will decline	Long term Adverse	High	
Range Improvements				
Water	7 water developments	Long term Adverse	Low	Same impacts as expected under the proposed action.
	875 acres sacrifice area	Long term Adverse	Low	

TABLE 3-7 (continued)

ALTERNATIVE #2

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
TORTOISE				
Grazing				
Rest Rotation	Improving to good: 1,422 acres	Long term Beneficial	Low	Desert tortoises would benefit more from this alternative than from the proposed action.
	Improving to fair: 3,180 acres	Long term Beneficial	Low	Under both deferred and rest-rotation systems, reduced utilization on allotments in good and fair condition (also based on trend) and deferment of grazing for 5 years on allotments in poor condition would improve overall desert tortoise habitat.
	Static good: 3,025 acres	Long term Beneficial	Low	
				The density of forbs and perennial grasses is expected to increase faster than expected under the proposed action.
	Static fair: 18,120 acres	Long term Beneficial	High	
	Static poor: 97,099 acres	Long term Beneficial	High	
Deferred Systems	Improving to good: 589 acres	Long term Beneficial	Low	Desert tortoise habitat condition is expected to improve faster than under the proposed action.
	Static good: 2,016 acres	Long term Beneficial	Low	
	Static poor: 42,895 acres	Long term Beneficial	High	
	The following 2-pasture deferred systems will decline:			
	Beaver Dam Slope- 34,227 ac. Cedar Wash - 589 ac. Total 34,816 ac.	Long term Adverse	Low	Same impacts as expected under the proposed action.
Less Intensive Management	Improving to good: 780 acres	Long term Beneficial	Low	Same impacts as expected under the proposed action.
	Static fair: 8,163 acres	Long term Beneficial	Mod.	
	Static poor: 21,656 acres	Long term Beneficial	High	
	30,599 acres would decline	Long term Adverse	High	
Range Improvements				
Water	4 water developments	Long term Adverse	Low	Same impacts as expected under the proposed action.
	500 acres sacrifice area	Long term Adverse	Low	

ALTERNATIVE #3

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
TORTOISE				
Grazing				
Rest Rotation	Improving to good: 1,422 acres	Long term Beneficial	Low	Same impacts as expected under the proposed action.
	Improving to fair: 3,180 acres	Long term Beneficial	Low	
	Static good: 3,025 acres	Long term Beneficial	Low	
	Static fair: 18,120 acres	Long term Beneficial	High	
	Static poor: 97,099 acres	Long term Beneficial	High	
Deferred Systems	Improving to good: 589 acres	Long term Beneficial	Low	Same impacts as expected under the proposed action.
	Static good: 2,016 acres	Long term Beneficial	Low	
	Static poor: 42,895 acres	Long term Beneficial	High	
	The following two-pasture deferred systems would decline:			
	Beaver Dam Slope: 34,227 ac. Cedar Wash: 589 ac. Total 34,816 ac.	Long term Adverse	High	Same impacts as expected under the proposed action.
Less Intensive Management	Static fair: 8,943 acres	Long term Beneficial	Mod.	Same impacts as expected under the proposed action.
	Static poor: 21,656	Long term Beneficial	High	
	30,599 acres will decline	Long term Adverse	High	Same impacts as expected under the proposed action.
Range Improvements				
Water	7 water developments	Long term Minimal	Low	Same impacts as expected under the proposed action.
	875 acres sacrifice area	Long term Adverse	Low	Same impacts as expected under the proposed action

TABLE 3-7 (continued)

ALTERNATIVE #4

Action	Habitat Area Affected	Nature and Duration of Impact	Significance	Comments
		TORTOISE		
Grazing				
Less Intensive Management	Static good: 5,041 acres	Long term Beneficial	Low	134,864 acres of tortoise habitat (non-AMPs) would continue to decline under present management. Average utilization would exceed 50% on perennial and ephemeral vegetation. No grazing systems would be implemented, and the season of use would not be geared to benefit tortoise forage requirements. Density and vigor of perennial grasses, forbs, and browse would decrease.
	Static fair: 29,065 ac.	Long term Beneficial	High	
	Static poor: 164,830 ac.	Long term Beneficial	High	
	The following two-pasture deferred systems would decline:			
	Beaver Dam Slope- 34,227 ac. Cedar Wash - 589 ac. Total 34,816 ac.	Long term Adverse	High	Desert tortoise populations are expected to decline. 34,816 acres of tortoise habitat (implemented AMPs) would decline under a two-pasture deferred system. Key tortoise forage species would decrease in density and vigor.

TABLE 3-8
SUMMARY OF PROJECTED TRENDS IN WILDLIFE HABITAT*

	Proposed Action			Alternative 1			Alternative 2			Alternative 3			Alternative 4			Alternative 5		
Species	Improve	Decrease	Static	Improve	Decrease	Static	Improve	Decrease	Static	Improve	Decrease	Static	Improve	Decrease	Static	Improve	Decrease	Static
Mule Deer	387,850	20,120	8,986	281,103	225,047	8,986	665,516	20,157	8,986	665,553	20,120	8,986	132,675	618,913	0	763,663	0	0
Pronghorn Antelope	182,969	23,817	4,494	182,339	50,211	4,494	208,733	23,817	4,496	208,733	23,817	4,496	148,506	68,241	0	212,251	0	0
Bighorn Sheep 1/	95,629	8,791	11,213	16,836	44,016	11,213	95,629	8,791	11,213	95,629	8,791	11,213	14,486	108,299	0	197,197	0	0
Desert Tortoise	133,530	66,290	0	36,903	162,917	0	133,530	66,290	0	133,530	66,290	0	30,140	169,680	0	206,774	0	0
Nongame 2/, Upland and Small Game 3/	1,056,522	262,040	101,181	231,809	864,101	100,911	1,056,522	262,040	101,181	1,169,448	149,114	101,181	599,717	1,248,876	0	1,644,364	0	0
Riparian Condition		Static			Declining			Static			Static			Declining			Improving	

* Trend was based on assumptions and Table 3-7

1/ Unsuitable acres not included.

2/ Nongame species include nongame birds, small mammals, amphibians and reptiles, upland and small game, birds of prey, and carnivores.

3/ Upland, small game will benefit from pinyon-juniper woodland manipulation. Subtract 85,760 from decline column.

Two- and three-pasture deferred systems differ significantly in their apparent effect on wildlife habitat. Three-pasture systems generally provide a full year's rest during the spring and summer growing seasons in at least one pasture. Three-pasture systems would rest 93,379 acres (out of 282,966 acres of habitat) for a full year. Range trend studies show that plants have responded positively to this system, and this system is expected to upgrade wildlife habitat conditions.

Under the two-pasture system only half the allotment would be rested during the growing season, and the entire allotment would be grazed each year. A total of 148,968 acres of habitat prescribed for two-pasture systems would receive only seasonal rest (spring or summer). Vegetation is not expected to respond well to two-pasture systems, causing wildlife habitat conditions to remain static or decline.

Less Intensive Grazing Management

Eleven allotments would remain under less intensive management, involving 105,338 acres of habitat. Grazing on these allotments has been reduced to the estimated livestock carrying capacity and would be restricted to an average annual utilization of 50 percent. Less intensive management allows yearlong grazing and provides little rest to meet physiological needs of plants. Wildlife habitat conditions are expected to remain static or decline if utilization is not closely monitored.

Ephemeral Grazing

Areas below 3,600 feet in the EIS area are classified as perennial/ephemeral ranges. In years with abundant annual vegetation additional livestock may be licensed on these allotments. Allotments footnoted (e) in table 1-2, Livestock Grazing Summary, contain perennial/ephemeral range involving 541,892 acres of habitat.

Overall wildlife habitat conditions are expected to improve under proposed ephemeral grazing practices, primarily because of the 50 percent average utilization limit. The expected increase in forb production would directly or indirectly benefit most wildlife species.

Alternative 1 — Full Stocking

Excessive utilization (an average of 75 percent) under the full stocking alternative would adversely impact 71 percent of the EIS area (1,308,498 acres). Habitat conditions of allotments proposed for rest-rotation grazing (968,916 acres) would decline more rapidly than at present and more rapidly than would conditions on allotments under implemented AMPs undergoing rest-rotation grazing. Habitat conditions on allotments under implemented AMPs and those managed under deferred systems and less intensive management would remain the same.

Rest-Rotation

Under the full stocking alternative allotments currently under and proposed for rest-rotation grazing would be grazed at a higher stocking rate than in the past. A total of 1,308,498 acres of habitat would decline. Failure to subtract carrying capacity of the rested pasture from the total carrying capacity of the allotment inevitably results in high utilization and stocking levels. The 75 percent utilization in many cases would offset the advantage of longer rest periods (16 months) built into rest-rotation systems. Browse species would suffer significantly more than forbs or grasses because of higher utilization. (Browse requires lower utilization and longer rest to restore carbohydrate reserves.) Vegetation species composition would shift to less palatable forage species, and xeric-adapted species would increase in composition.

Competition among wildlife species and between wildlife and livestock for forage is expected to increse on allotments proposed for rest-rotation grazing. Wildlife food and cover would remain in an unacceptable condition.

Deferred Systems

Deferred systems under the full stocking alternative are predicted to have the same impacts on wildlife habitat as these systems under the proposed action.

Less Intensive Grazing Management

Habitat condition on less intensively managed allotments largely depends on the range management practices of individual ranchers. Current habitat conditions are projected to remain static under the full stocking alternative. Some habitats might improve, however, if utilization is held to 50 percent with periodic rest.

Ephemeral Grazing

Historically no limit was set on the use of ephemeral vegetation, and the use was high. Under the full stocking alternative, heavy use would prevail. Heavy average utilization (75 percent) is expected on allotments under rest-rotation grazing, and 333,107 acres of ephemeral habitat can be expected to deteriorate.

Excessive grazing of ephemeral vegetation would impact sedentary wildlife (small mammals, reptiles, and amphibians) greater than it would more mobile species, resulting in food shortages and inadequate cover. Although ephemeral licensing would not be permitted during drought, many desert-adapted species do not reproduce during droughts. Desert tortoises, for example, are thought to reproduce only in years of above-normal vegetation production (Berry, 1978)

Alternative 2 — Stocking by Condition Class

Under alternative 2 livestock grazing pressure would decrease by 64 percent as compared to the 25 percent projected decrease under the proposed action. Each year 62 percent of 1,144,580 acres of habitat would be rested, of which 881,970 acres in poor condition with a downward trend would be rested for 5 years. Allotments in fair and good condition would be stocked at lower levels (below an average utilization of 50 percent) until the trend is upward.

The advantages to wildlife of a 5-year deferment of grazing would be short term. At the end of 5 years BLM would analyze allotments on the basis of livestock forage production, stock them at the estimated livestock carrying capacity, and implement the grazing systems of the proposed action. After 5 years the same amount of habitat — 31 percent (572,689 acres) would be rested as prescribed by the proposed action.

The 5-year grazing deferment would improve wildlife food and cover to varying extents, depending on the successional stage, vegetation type, and current condition. The pinyon-juniper woodland communities are expected to improve at a slower rate than the sagebrush or grassland types. Subtle changes in vegetation species composition and density, however, can affect how certain species would benefit. Wildlife-livestock competition would cease during the deferment period. Moreover, on allotments with decreased stocking levels wildlife-livestock competition for food would decrease below levels expected under the proposed action.

Rest Rotation

Wildlife habitat conditions are expected to improve more rapidly on allotments deferred from grazing (683,654 acres) than on allotments undergoing reduced stocking levels (624,854 acres). Browse and herbaceous species are expected to increase in vigor and density faster under the stocking by condition class alternative than they would under the proposed action.

Less Intensive Grazing Management

The range condition of less intensively managed allotments may slightly improve where utilization is reduced (Quail Canyon and Mustang Spring allotments). Wildlife habitat on allotments deferred from grazing for 5 years (9,685 acres) is expected to moderately improve.

Ephemeral Grazing

The 5-year deferment of grazing should improve 303,990 acres or 60 percent of the ephemeral habitat. Competition for ephemeral vegetation should decrease, benefiting nongame wildlife the most.

Alternative 3 — No Vegetation Manipulation

Grazing systems under the no vegetation manipulation alternative would have the same impacts as under the proposed action.

Alternative 4 — No action

Under the no-action alternative, the 16 allotments (926,343 acres) currently managed under AMPs would be managed according to MFP recommendations, under an average utilization of 50 percent and under other criteria listed in chapter 1. Utilization on allotments not managed under AMPs can be assumed to exceed an average of 50 percent.

Current range conditions indicate an overall deterioration of biotic communities. Low annual precipitation and high livestock forage utilization have kept the productivity of many vegetation communities far below their potential. A continued high level of use as proposed under this alternative would reinforce the already downward trend.

The past 100 years of livestock grazing have probably caused most wildlife populations to stabilize at low densities and diversities. Species extremely sensitive to habitat change, however, may have already disappeared from the EIS area.

The no-action alternative would not significantly change the present impacts of grazing systems on wildlife populations on non-AMP allotments. Evaluating the impacts of existing grazing systems under this alternative is difficult. Most allotments with implemented AMPs are overstocked and undergo moderate to high utilization, making it difficult to tell if a system works on a properly stocked range. Moreover, determining the best period of use to minimize wildlife-livestock conflicts is difficult, because some systems have been broken during drought or as a result of a lack of understanding on pasture rotation dates.

The vigor and density of browse, forbs, and cool- and warm-season grasses are projected to decrease on allotments with consistently high utilization regardless of the grazing system. In fact, utilization under the no-action alternative is expected to exceed utilization under full stocking. Under the full stocking alternative, the number of livestock would be reduced to the estimated carrying capacity of the range, whereas, under no action, operators taking advantage of their full active privileges could increase the stocking level.

Rest Rotation

Besides the high average utilization (67 percent) on non-AMP allotments (674,722 acres), the no-action alternative would allow significantly less rest than the proposed action. The proposed action would rest 412,358 acres, whereas the no-action alternative would rest 198,474 acres. High utilization and improper season of use would continue to deteriorate wildlife food and cover conditions on non-AMP allotments.

Deferred Systems

Deferred grazing systems would rest significantly less habitat annually under no action (60,984 acres) than under the proposed action (142,538 acres). Only 15 percent of the total acreage would be rested under no action, whereas 31 percent of the total acreage would be rested under the proposed action. Under no action approximately 162,554 acres of habitat on non-AMP allotments would continue to decline because of excessive utilization.

Less Intensive Grazing Management

Less intensive grazing under the no-action alternative would generally have the same impacts as expected under the full stocking alternative. Potentially, however, utilization could increase if less intensively managed allotments are stocked significantly higher than the estimated livestock carrying capacity, as they would be if operators used their full active privileges. If full active privileges were activated, wildlife habitat conditions would deteriorate at a faster rate than at present.

Ephemeral Grazing

Under no action the utilization of ephemeral vegetation would exceed 50 percent on 442,563 acres of habitat on non-AMP allotments, constituting 82 percent of the ephemeral habitat. The impacts to wildlife habitat would depend upon utilization. During droughts or years with marginal ephemeral blooms, if operators use their full active privileges, a higher rate of utilization would be expected than under the full stocking alternative. Most allotments are currently stocked lower than the active privileges. Additional licensing above active privileges (especially if high utilization is permitted) during years of abundant ephemerals would severely impact nongame populations by decreasing food supply and nesting cover.

Alternative 5 — Elimination of Grazing on Federal Lands

The removal of domestic livestock grazing from the EIS area's Federal rangelands would end all livestock-wildlife conflict, including competition for food. Once plant succession proceeds to a more natural state, wildlife communities would return to pregrazing densities and diversities, and community inter- and intrarelationships would again function as a natural ecological system.

The overall benefit to wildlife of livestock exclusion is not necessarily correlated with an improvement in the diversity of palatable livestock forage species. Increases in plant species unpalatable to livestock and even subtle changes in vegetation structure and composition resulting from elimination of livestock may markedly increase the productivity of wildlife populations. The degree to which wildlife populations would benefit would be difficult and costly to demonstrate.

The time required for various wildlife populations to respond to the elimination of grazing would vary by wildlife species, plant association, amount of precipitation, presence of viable seed sources, plant species depleted by livestock grazing, and the successional stage of both animal and plant communities. Plant and animal populations are not expected to significantly respond to complete rest within 15 years, since livestock have grazed most of the EIS area's ranges for 125-150 years.

Depending on successional stages maintained by livestock grazing, subclimax wildlife species in the long term might not benefit from livestock removal but rather decline in population. The density of early successional species are projected to decrease as plant succession shifts toward a climax. On the other hand, the overall diversity of wildlife communities is expected to increase.

WATER DEVELOPMENTS

Additional livestock waters would increase the intensity of livestock grazing over a larger area. Areas with poor water distribution in the past have had light livestock use. Better distribution of livestock would relieve grazing pressure in other areas and potentially reduce livestock-wildlife competition. Livestock and wildlife would increasingly compete for food and cover, however, on formerly lightly used areas.

Proposed Action

The proposed action provides for 86 new water developments. These waters would benefit wildlife dependent upon water, allowing them to expand into habitats previously lacking water and to use food and cover around new waters. The development of these waters, however, would degrade 10,750 acres of habitat or 125 acres per development. Table 3-9 shows the areas that would be affected and the extent of degradation. In addition, intensive livestock use around water developments would reduce protective cover and forage and increase the vulnerability of prey species to predators. Predators in the long term would thus benefit from this habitat change. Cover and forage conditions around waters would decline regardless of the grazing system implemented.

Reservoirs containing water 7 months out of the year and providing important wildlife habitat (approximately 10 percent of total reservoirs) would be fenced to upgrade shoreline vegetation. Increased cover and food within the fenced area would enhance wildlife habitat.

The shoreline habitats of unfenced reservoirs would remain deteriorated. High livestock soil compaction would not allow time for seedlings to establish even when reservoirs are within rested pastures. Denuded areas around reservoirs offer little suitable habitat except as a water source for land species and resting areas for migrant waterfowl.

Alternative 1 — Full Stocking

Under the full stocking alternative the same number of waters would be developed as under the proposed action, resulting in the same improvement in the distribution of water.

Higher utilization on rest-rotation allotments would denude slightly larger areas next to reservoirs. Moreover, livestock would compact soil in a slightly larger area, restricting the establishment of cover around reservoirs. Wildlife populations would be adversely impacted over a larger area than under the proposed action.

Alternative 2 — Stocking by Condition Class

Since BLM would not develop waters on allotments deferred for 5 years under this alternative, 50 percent of the proposed waters (43) would not be constructed. Increased water distribution would therefore enhance water-dependent wildlife populations only half as much as it would under the proposed action or alternative 1. The creation of sacrifice areas around new waters would affect only half the area (4,188 acres) as expected under the proposed action, and sedentary wildlife populations would be impacted on 50 percent less area than under the proposed action.

Wildlife habitat around fenced reservoirs would improve as under the proposed action. Some annual shoreline vegetation should be able to become established in sacrifice areas around existing waters on allotments proposed for a 5-year deferment of grazing, although the benefit to wildlife would be short term. Vegetation around unfenced reservoirs, however, would remain degraded.

Alternative 3 — No Vegetation Manipulation

The development of new waters under this alternative would have the same impact as under the proposed action.

TABLE 3-9
DEGRADED AREAS AROUND WATER DEVELOPMENTS

Distance From Water Source (Feet)	Area Affected Acres	Total Area Affected	Degree of Impact
250	4.5	387	Habitat denuded, Little food or cover exists. Severe adverse impact.
750	35	3,010	Poor wildlife, food, and cover conditions. Severe to moderate adverse impact.
1,320	125	10,750	Greater than 50% utilization. Food and cover conditions remain poor. Moderate adverse impact.

Alternative 4 — No Action

Under the no-action alternative only the 18 waters required for implementing existing AMPs would be developed, adversely impacting 2,250 acres of habitat. Overgrazed areas next to water developments would degrade wildlife food and cover. This alternative's impacts on habitat around fenced and unfenced reservoirs would be the same as those under the proposed action and alternatives 1, 2, and 3.

Alternative 5 — Elimination of Grazing on Federal Lands

Under the elimination of grazing alternative, the existing operator-developed waters, consisting mainly of reservoirs, springs, and wells, would no longer be maintained on Federal lands. Approximately 25 reservoirs serving as major sources of dependable water and maintained by operators would eventually silt in and would no longer provide water for wildlife. Most spring sources should continue to supply wildlife water, and federally developed waters would remain operational to meet other resource needs.

Wildlife species dependent on manmade water sources not developed by BLM are expected to decrease in distribution and possibly numbers. These species would once again display historical distributions of the pregrazing era in habitats lacking water.

The elimination of grazing would allow 45,500 acres of habitat (125 acres of disturbed land around each of 364 water developments) to recover and return to a satisfactory condition. Moreover, 10,750 acres of habitat would not change as expected under the proposed action and alternatives 1 and 2.

FENCES

Proposed Action

The construction of 137 miles of new fences would interfere with mule deer, pronghorn antelope, and desert bighorn sheep movement. In the Black Rock area alone, four mule deer were found dead from fence entanglement in the first 4 months of 1979 (Dickens, 1979). Numerous undiscovered deer must have died in fences in the EIS area, especially those around water developments. Although fences would be constructed to reduce mortality of big-game species, an unknown number of animals are expected to die while trying to cross fences. Fences may also change movement patterns, particularly until animals learn to cross new fences. The magnitude of this impact is also unknown.

Alternative 1 — Full Stocking

The impact of fences on animals under the full stocking alternative would be the same as under the proposed action.

Alternative 2 — Stocking by Condition Class

This alternative would require only 69 miles of new fences, only half of the 137 miles of fence required by the proposed action and alternative 1. Depending on specific areas and ungulate use patterns, this alternative could reduce potential fence-crossing and mortality problems by 50 percent during the 5-year deferment period.

Alternative 3 — No Vegetation Manipulation

Fences under this alternative would have the same impact as under the proposed action.

Alternative 4 — No Action

Since implementing existing AMPs would require only 8 miles of new fencing rather than the 137 miles under the proposed action, the no-action alternative would permit fewer big-game deaths in crossing fences.

Alternative 5 — Elimination of Grazing on Federal Lands

The construction of new fences around State and private lands would further hinder big-game movement and potentially increase the death loss from entanglement in fences. The resulting increase in big-game mortality cannot be predicted.

VEGETATION MANIPULATION

Proposed Action

The impact of habitat conversion through vegetation manipulation would vary by vegetation community, species of wildlife present, design features, and method of treatment. Land treatment on 128,510 acres of habitat would involve 85,760 acres of pinyon-juniper woodland, 25,100 acres of sagebrush, and 17,650 acres of blackbrush. Of these three vegetation subtypes, pinyon-juniper provides habitat for the greatest number of species, followed by sagebrush and then blackbrush.

The diversity of nongame wildlife is expected to decrease in all three habitats, the pinyon-juniper being most dramatically affected. The density of certain nongame species, however, is expected to increase as a result of habitat conversion.

Otherwise, land treatment would generally benefit wildlife habitat. Small game and upland game would benefit from the conversion of all three vegetation subtypes if an adequate shrub layer remains and debris is left in place for adequate cover. Treatment would enhance mule deer and pronghorn antelope habitats through improved forage conditions and range succulence. Carnivores and birds of prey should benefit from the increased abundance of prey species.

Alternative 1 — Full Stocking

The full stocking alternative would allow heavier utilization than prescribed by the proposed action, decreasing the value of conversion areas to wildlife. In addition, under rest rotation a faster reinvasion of native habitat than would occur under the proposed action might shorten the time period in which wildlife would benefit from increased forage. Approximately 86,800 acres of habitat would degrade on rest-rotation allotments, adversely impacting nongame, small game, upland game, and big game.

Alternative 2 — Stocking by Condition Class

Vegetation manipulation under this alternative would have the same impacts as under the proposed action, except treatment would affect a smaller area (61,059 acres as opposed to 128,510 acres). The potential increase in forage for ungulates would decrease by 50 percent, as would the area in which diversity of nongame animals would decrease.

Alternative 3 — No Vegetation Manipulation

This alternative calls for no land treatment and would result in no decrease in the density of nongame populations. The 54,000 acres of big-game habitat would not improve as projected under the proposed action. Big-game benefits from the treatment would depend primarily on the location of treatment areas. Since many areas proposed for treatment have low big-game densities, big game would not benefit until they reach higher densities.

Alternative 4 — No Action

Under no action, only 50,620 acres would be treated — that needed to implement existing AMPs. Impacts to wildlife populations would be similar to those expected under the proposed action and alternatives 1 and 2, but they would occur over a smaller area.

Alternative 5 — Elimination of Grazing on Federal Lands

Elimination of grazing would allow the 51,360 acres of existing land treatments to revert to native habitat. No land would be treated as called for in the proposed action. Suitable habitat for big game, small game, and upland game would be reduced, forcing these species to readjust to pre-land treatment lower densities as habitat returns to a natural state.

The diversity of nongame populations would increase, but the density of some early successional species would decrease. Disturbed habitats required by wildlife were historically maintained through natural phenomena such as fire and flood. Therefore, if wildfires were allowed to burn, they would provide habitat for these subclimax wildlife species.

WET MEADOW AND RIPARIAN HABITATS

Proposed Action

The proposed action calls for the fencing of springs containing significant wet meadow habitats or other unusual wildlife values that are in a deteriorated condition. The majority of springs in the EIS area with development potential have already been developed, but some springs may be redeveloped under the proposed action and its alternatives. If additional springs are developed or redeveloped, water would remain at the source for wildlife use. BLM will also consider provisions for maintaining a portion of the wet meadow habitat.

Fenced springs would benefit practically all wildlife species, although bighorn sheep and mule deer might have problems learning to cross fences to use forage within exclosures. Water will be available outside exclosures yearlong.

The expected improvement of unfenced spring habitats is difficult to predict. Head cutting, topsoil conditions, spring gradient, season and length of use by livestock, and nearby range conditions help determine spring habitat conditions.

Overstory species such as cottonwood and willow would decrease in density regardless of the grazing system. Wildlife species dependent on canopy-forming vegetation would be adversely impacted. Localized nongame bird populations (fly catchers, woodpeckers, orioles, hawks, and owls) would decline.

Likewise, the density and species composition of herbaceous species is not expected to improve significantly under proposed or current grazing systems. Consequently, small mammal, reptile, and amphibian populations should remain below their natural (ungrazed) potential.

Unfenced springs used by livestock are expected to remain in unsatisfactory condition, adversely affecting nongame wildlife, especially amphibians.

The wildlife habitat condition of spring environments on less intensively managed allotments and during years of ephemeral licensing would deteriorate at a faster rate than under grazing systems or without ephemeral grazing.

The majority of riparian habitat in the EIS area occurs on the flood plains of the Virgin River and Beaver Dam Wash. The impacts to wildlife populations would be essentially the same as projected for wet meadow habitats. Areas not protected from livestock grazing would experience further deterioration of wildlife habitat.

BLM is conducting a study to determine where livestock are seriously damaging the riparian zone. At the completion of this study, livestock will be removed from problem areas.

Alternative 1 — Full Stocking

Rest-rotation grazing under full stocking would cause spring and riparian habitats to deteriorate at a faster rate than they would under the proposed action. Moreover, wildlife populations would decline due to higher utilization levels of phreatophytic vegetation.

Alternative 2 — Stocking by Condition Class

In general, an improvement of wildlife habitat conditions can be expected on allotments deferred for 5 years, but the benefit to wildlife would be short term unless springs are fenced before reinstating livestock grazing.

Four allotments bordering the Virgin River and one allotment bordering Beaver Dam Wash would be rested for 5 years. Even though wildlife along riparian zones would benefit from an expected increase in vigor and density of overstory and herbaceous species, the overall benefit would be short term. An additional reduction in stocking rates and utilization could slightly upgrade the condition of habitats that border these streams on nondeferred allotments.

Alternative 3 — No Vegetation Manipulation

This alternative would have the same impacts on wet meadow and riparian habitats as the proposed action.

Alternative 4 — No Action

Excessive livestock grazing would maintain wildlife communities associated with wet meadow and riparian environments in a degraded condition. Spring and riparian habitats on non-AMP allotments would suffer even more than allotments under some type of grazing management.

Alternative 5 — Elimination of Grazing on Federal Lands

Amphibians and other nongame and game species would especially benefit from improved habitat conditions. The full productive potential of spring and riparian wildlife communities could be realized.

Spring and riparian habitats would no longer require fencing, and the potential fence hazards to big-game species would be eliminated.

INCREASED WILDFIRES

Proposed Action

Implementing rest-rotation and deferred grazing systems would allow litter to build up in most communities, increasing the susceptibility to wildfires and benefiting wildlife habitat. If fires are allowed to burn significant areas before being controlled, they will allow increased production of forage, forbs, and browse.

Alternative 1 — Full Stocking

A reduction in litter build-up on rest-rotation allotments would reduce the susceptibility of areas to wildfires under the full stocking alternative.

Alternative 2 — Stocking by Condition Class

The accumulation of litter from the deferment of grazing for 5 years on 858,072 acres of habitat might increase the frequency of wildfires under this alternative. Depending on the vegetation community and the acres burned, wildfires under stocking by condition class could potentially benefit wildlife more than wildfires under the proposed action. Lower utilization (30 to 50 percent), as well, could increase the susceptibility to wildfire on other allotments. Such benefits would be short term, however, since the restoration of grazing would reduce the accumulation of litter.

Alternative 3 — No Vegetation Manipulation

Wildfires under no vegetation manipulation would have the same impact as under the proposed action.

Alternative 4 — No Action

Under the no-action alternative, allotments under implemented AMPs would be as susceptible to wildfire as they would under the proposed action, and wildfires would have the same benefits to wildlife habitat. On the other hand, non-AMP allotments, being more heavily grazed and having less accumulation of litter, would be less susceptible to fire than they would be under the proposed action, and no action would less benefit wildlife habitat.

Alternative 5 — Elimination of Grazing on Federal Lands

Elimination of grazing would have the greatest potential for natural fire cycles to reestablish. Implementation of a "let burn" policy could allow plant and animal communities to operate as they once did before the livestock grazing era.

BURROS

The burros in the Tassi allotment would generally benefit from the proposed action and its alternatives. Adverse impacts would be negligible except those noted below.

Intensive management under the proposed action and alternatives 1, 2, and 3 would provide water where none now exists and would give burros additional year-round range. Each alternative would allocate 500 AUMs of forage to burros, enough to support up to 100 burros. Low stocking levels and a rest-rotation grazing system would help protect vegetation and ensure adequate forage for burros. Year-round waters would be required in each pasture to accommodate burros.

Fences required to implement a grazing system would inhibit burro movement to an unknown extent. The type of fence required to hold livestock but allow burros passage is also unknown.

Proposed Action and Alternative 3

The proposed action and the no vegetation manipulation alternative would set the livestock stocking rate on the Tassi allotment at 1,529 AUMs, 404 AUMs above the 5-year average licensed use. This stocking rate is not expected to adversely impact the burro herd or inhibit the burro population growth.

Alternative 2

The stocking by condition class alternative would defer grazing on Tassi allotment for at least 5 years. This deferment would initially benefit burros, since they would not have to compete with livestock for forage. The herd would then expand more rapidly than at present, but once grazing resumes on the allotment, burros would have less forage, and population growth would slow.

Alternative 4

Under the no-action alternative the livestock stocking rate on the Tassi allotment would remain at the present 5-year average. Livestock-burro forage competition would not change, and the burro population would continue to expand at the present rate. This alternative proposes no additional water developments, and burros would continue using existing waters.

Alternative 5

This alternative would eliminate grazing on the Tassi allotment, making no provision for future resumption. Of all alternatives, this would benefit burros the most, since they would no longer compete with livestock for forage. The burro population would expand, constrained only by the available habitat and its condition.

CULTURAL RESOURCES

A lack of detailed inventory and research data hampers projecting impacts to cultural resources on an allotment-specific basis. Although no predictive site-density data exist, a review of existing information reveals a general pattern of habitation sites occurring at the higher elevations in the big sage, juniper, and pinyon ecotones. The lower elevation grasslands and desert shrub ecotones contain the more fragile sites of the hunter and gathering cultures and seasonal exploitive sites of the Virgin Anasazi and Paiutes.

The effect of any proposal on cultural resources depends upon the type of site and its significance to the region.

The following agents (in order of descending responsibility) are continuously disturbing and destroying cultural resources:

- Relic hunters and vandals;
- Ground disturbance construction;
- Man-caused erosion, accelerated by deforestation, land clearing, and grazing; and
- Natural weathering and erosion.

In analyzing the probable impacts of the proposed action on cultural resources, the BLM district archaeologist considered the following:

- Type of proposal;
- Nature and degree of primary and secondary impacts;
- Projected cultural site density in the area; and
- Proposed mitigation measures.

Proposed livestock grazing and range developments could disturb certain cultural resources. Once disturbed, historical and archaeological sites and artifacts would be precluded from future study. Such loss could create an irretrievable data gap in the history of an area.

Inventory and assessment of cultural resources directly affected by the proposal would increase scientific knowledge of the area and provide a data base of long-term gains. On the other hand, if an inventory fails to discover a surface site that is later destroyed by range development construction, scientific data could be permanently lost. Table 3-10 summarizes the potential impacts of the proposed action and its alternatives on cultural resources.

CATTLE TRAMPLING

Cattle trampling would continue to damage archaeological sites. Cattle trampling does not generally disturb cultural resources unless a large number of cattle are concentrated where resources are exposed, such as at catchments, tanks, springs, salt licks, and trails. Trampling primarily damages fragile artifacts: lithics, ceramics, and surface structures. Trampling also destroys stratification by mixing the layers in the medium-to-coarse soils. Since an intensive cultural resources inventory has not yet been completed, the number and significance of sites currently being trampled by livestock is unknown.

Although many variables are involved, the intensity of damage caused solely by cattle is assumed to be directly proportional to the AUMs of forage used per pasture. Thus, reducing livestock use would correspondingly reduce artifact damage. In the long term, however, damage could increase somewhat because of the estimated increases in forage and the resulting increases in livestock use.

Sheet erosion, washing away and redepositing soil, would continue to damage sites.

WATER DEVELOPMENTS AND FENCES

Heavy machinery crossing a site disturbs and sometimes obliterates the horizontal surface manifestations of the site by breaking and scattering artifacts and by destroying the existing features and structures. Machinery digging into a site not only disturbs the horizontal surface but also disturbs and destroys the vertical strata of cultural and paleoecological deposition. Additional impacts arise from the roads

TABLE 3-10
POTENTIAL IMPACTS ON CULTURAL RESOURCES

Proposal, Alternative, or Development	Agent of Impact	Primary Effect	Secondary Effect	Degree of Impact
Proposed Action	Cattle trampling/Rubbing	Loss of site integrity (patterning and stratiography)	Artifactual breakage and structural damage	Low -
	Decreased erosion	Less artifactual displacement/ exposure	Less loss in analytical data and vandalism	Low +
Full Stocking with Management	Cattle trampling/Rubbing	Same as Proposed Action	Same as Proposed Action	Moderate -
	Increased erosion	More displacement/exposure of artifacts	More loss of analytical data and increased vandalism	Moderate -
Stocking by Condition Class	Cattle trampling/Rubbing Decreased erosion	Same as Proposed Action	Same as Proposed Action	Low -
No Vegetation Manipulation	Cattle trampling/Rubbing	Same as Proposed Action	Same as Proposed Action	Low -
	Continued erosion	Same as Full Stocking	Same as Full Stocking	Low -
No Action	Cattle trampling/Rubbing	Same as Proposed Action	Same as Proposed Action	Moderate -
	Increased erosion	Same as Full Stocking	Same as Full Stocking	Moderate -
Elimination Water Developments and Fences	Surface and subsurface disturbance by equipment	Loss of site integrity	Loss of analytical data	High -
	Cattle concentration	Compaction/Erosion	" " " "	High -
	Cattle trails	Erosion/Trampling	" " " "	Low -
	Vandalism	Loss of analytical data		High -
Chaining	Surface and subsurface disturbance by equipment	Loss of site integrity	" " " "	Moderate to High -
	Vandalism	Loss of analytical data		Moderate -
Burning	Heat fracturing of lithics, heat discoloration and distortion of ceramics, combustion of flammable artifacts, contamination of site for C^{14} dating and pollen analysis	Loss of site integrity	Loss of analytical data	High -
	Exposure of site/artifacts through loss of vegetation	Temperature increased erosion	Vandalism	High -
	Fire suppression, i.e. fire line construction	Loss or disturbance of site integrity	Loss of analytical data	Low to High -
Disc or Plow	Surface and subsurface	Loss of site integrity	" " " "	High -
	Exposure of artifacts	Vandalism	" " " "	
Seeding	Compounds all above land treatments since it follows the specific treatment			Low -
Two-Track Road	Disturbance of surface	Loss of site integrity (patterning and breakage)	Loss of analytical data	Low -
	Access	Vandalism	" " " "	High -

made by moving in heavy equipment and fence-building equipment. Cattle tend to trail along these embryonic roads and along fence lines, disturbing sites and creating new erosion channels. Construction crews vandalize cultural sites near construction sites. Finally, the cattle concentration compacts soil around catchments and tanks. Trails leading to water developments create additional erosion channels and disturb sites along their route.

LAND TREATMENTS

The proposed land treatment is the only action that would significantly impact cultural resources. Three techniques of land treatment are proposed: chaining, plowing, and burning. In some cases seeding with a range drill is also proposed.

Pinyon-juniper chaining would have a moderately adverse impact on unlocated structural sites and a high adverse impact on fragile surface sites. Heavy equipment and the dragging chain would disturb the soil surface and subsurface, mixing soil and breaking artifacts. Plowing sagebrush would have essentially the same impacts as chaining.

Burning would have the highest adverse impact on sites, especially in the areas of fire control and fire suppression.

The EIS area has many trails, mines, line shacks, and cabins, potentially eligible for nomination to the National Register of Historic Places. Research and ground-truthing of routes remain to be done, but some fence construction and land treatments are expected to impact these cultural resources.

VISUAL RESOURCES

The impact of proposed grazing systems and range developments on visual resources would depend on the Visual Resource Management (VRM) class of the area for which the project or grazing system is proposed. Design restrictions should allow any project proposed in a VRM class IV area to meet long-term VRM objectives.

Without specific project locations, neither the type of impact nor the VRM class acreage impacted can be determined. Thus, the impacts of proposed projects have been collectively analyzed for each VRM Class — I, II, and III. The results of this analysis are summarized in table 3-11.

The development of new waters — catchments, reservoirs, and troughs — would have significant long-term impacts on visual resources. The short-term impacts of troughs would be slight, but catchment and reservoir construction would highly disturb the form, color, and texture of the landscape. Reestablishing vegetation, however, would allow these features to meet long-term VRM class II objectives.

Additionally, cattle grazing and trampling would have a visual impact on an area of approximately 35 acres around each water, representing a moderately adverse long-term impact in Class III areas and a highly adverse long-term impact in Class I and II areas.

The development of springs would alter the form, color, and texture of the spring area, having a highly adverse short-term impact. Again, reestablishing vegetation would reduce this disturbance to a slightly adverse long-term impact that would meet VRM class II objectives.

Chaining, burning, and discing/plowing would have highly adverse short-term impacts, altering the form, color, and texture of the landscape and increasing the contrast between treated and untreated areas. The visual contrast would decrease over time as seedings reestablish vegetation. Chainings would therefore have a moderately adverse long-term impact. Burning and discing/plowing, if accompanied by seeding, would yield low to moderate beneficial impacts and would meet objectives for VRM Class II.

The fence proposed for the Littlefield Community allotment would not meet VRM objectives if the proposed location is within the Paiute Primitive Area. Similarly, any water developments or land treatments proposed within VRM Class I would be inconsistent with the VRM criterion that provides only for natural ecological changes in such areas.

Implementing proposed grazing systems would create an initial moderate contrast of color and texture between grazed and rested pastures. As range conditions improve, visual quality of the scenery would generally improve, upgrading slightly to moderately the scenic quality in all VRM classes. In the long term, grazing systems would benefit visual resources.

Alternatives 1 and 2 would have essentially the same impacts as the proposed action. These alternatives would apply the same grazing systems and combinations of allotments and range improvements in the development and implementation of AMPs. Alternative 1 (full stocking) would create additional visual contrasts between grazed and rested pastures by

TABLE 3-11
LONG-TERM IMPACTS OF RANGE DEVELOPMENTS ON VISUAL RESOURCES

Development	Class I	Class II	Class III
Water Developments			
Springs	M-	L-	L-
Troughs	M-	M-	M-
Pipelines	M-	L-	L-
Reservoirs	H-	H-	M-
Catchments	H-	H-	M-
Fences	M-	M-	L-
Land Treatment			
Chaining	H-	M-	M-
Discing/Plowing	M+	M+	L+
Burning	M+	M+	L+

L = Low; M = Moderate; H = High + = Beneficial Impact; - = Adverse Impact allowing the use of 12,707 AUMs of forage more than that allowed by the proposed action. Alternative 2 (stocking by condition class) would have significant short-term benefits, allowing present ranges in poor or fair condition to recover faster than they would under the proposed action. As the AMPs are implemented, these improved aesthetic conditions would degrade to the level of conditions expected under the proposed action.

In the long term, alternative 3 (no vegetation manipulation) would have a moderately adverse impact on visual resources, similar to impacts of the proposed action excluding land treatment. Continued grazing pressure and lost forage expected from land treatments would alter the form, color, and texture of the landscape and increase the contrast between grazed and rested pastures. Alternative 3, however, would produce less soil erosion than the proposed action, since fewer acres of vegetation would be disturbed.

Alternative 4 (no action) would further deteriorate visual resources. Adverse visual impacts on non-AMP allotments would be potentially greater than under the proposed action because decreased vegetation on these lands would cause visual contrasts along fence lines. Soil disturbance and vegetation declines resulting from continued use would cause more intensive vegetation contrasts between AMP and non-AMP allotments than would occur under the proposed action.

Visual impacts resulting from developments on allotments under implemented AMPs would be similar to those of the proposed action. Under no action, fewer projects would exist in the area as a whole than under the proposed action, since few BLM range improvements would be built on non-AMP allotments.

Eliminating livestock grazing (alternative 5) would generally benefit visual resources. Existing range improvements would be removed, and the sites previously occupied by these facilities would gradually improve and blend in with undisturbed areas. Even with rehabilitation, however, range improvement sites would be noticeable. The removal of livestock from riparian areas would eliminate streambank trampling, enabling vegetation to reestablish and thereby improving visual quality. Less visual disturbance would accompany reduced erosion rates. A general improvement of the vegetation cover throughout the EIS area would enhance the general texture of the landscape.

The 423 miles of new fence would intrude on this natural landscape. Additionally, a vegetation contrast would be apparent where private and State land adjoin nongrazed Federal lands.

LAND USE

LIVESTOCK GRAZING

Under the proposed action and alternatives 1-4, grazing on Federal lands in the EIS area would continue but with different grazing treatments applied and at different intensities (see table 1-3). Under alternative 5, elimination of grazing, land use patterns of livestock grazing would significantly change since livestock would no longer graze on Federal lands.

Adjustments in Livestock AUMs

Table 3-12, Anticipated Livestock Impacts, shows the initial stocking rates and long-term changes expected under the proposed action and each alternative for each allotment. Table 3-13 summarizes the initial adjustments in stocking rates according to size of livestock operation.

All alternatives except for no action would initially reduce allowable livestock forage from the present 5-year average licensed use. Although at first this reduction would adversely impact livestock operators, over the long term initial reductions would be regained. All alternatives except 3 and 5 would increase the total AUMs of forage after 15 years.

In the short term, high stocking rates can increase livestock gains and income to the ranchers. Over the long term, however, heavy stocking rates decrease the ability of the range to produce forage and sustain grazing.

Livestock Operations

Implementing the proposed action or alternatives 1, 2, or 3 would impose intensive management on 24 allotments in addition to the 16 allotments now managed intensively under AMPs. These 24 allotments would be formed from 37 existing allotments.

Only one allotment would combine two operators not presently operating together: Last Chance and Link Spring allotments would be combined into the proposed Last Chance allotment. No specific problems are expected in handling or breeding livestock on this proposed allotment.

Five allotments would be combined to form an enlarged Wolfhole Mountain allotment, but the two operators involved would operate in common only in the pasture constituting the old Wolfhole Mountain allotment as they presently

TABLE 3-12

ANTICIPATED STOCKING RATES UNDER PROPOSED ACTION AND ALTERNATIVES*

		Proposed Action			Alternative 1			Alternative 2			Alternative 3			Alternative 4		
					Full Stocking			Stocking by Condition Class			No Vegetation Manipulation			No Action		
Allotment	5-Year Average	Initial 1/	15-Year 2/	Change 3/	Initial	15-Year	Change	Initial	15-Year	Change	Initial	15-Year	Change	Initial 4/	15-Year 4/	Change 5/
Intensive Management																
Beaver Dam Slope	802	772	772	- 30	772	772	- 30	Defer	772	- 30	772	772	- 30	903	903	+ 101
Black Rock	1,192	993	1,510	+ 318	1,489	1,979	+ 787	588	1,584	+ 392	993	1,021	- 171	2,866	2,866	+ 1,674
Blake Pond	1,483	1,264	2,018	+ 530	1,264	2,018	+ 530	758	2,081	+ 593	1,264	1,484	- 4	1,700	1,700	+ 212
Clay Spring	1,142	1,106	1,222	+ 80	1,106	1,222	+ 80	664	1,346	+ 204	1,106	1,222	+ 80	960	960	- 182
Cottonwood	1,791	1,221	1,999	+ 208	1,831	2,025	+ 234	Defer	2,004	+ 213	1,221	1,805	+ 14	2,303	2,303	+ 512
Diamond Butte	346	233	317	- 29	349	575	+ 3	233	423	+ 77	233	317	- 29	408	408	+ 62
Duncan Tank	442	418	517	+ 75	630	630	+ 188	418	645	+ 203	418	517	+ 76	583	583	+ 141
Grassie Mountain	5,704	3,063	7,004	+ 1,300	4,593	8,174	+ 2,470	2,755	7,212	+ 1,508	3,063	3,424	- 2,280	10,174	10,174	+ 4,470
Hidden and Sullivan	1,782	1,274	1,274	- 508	1,910	1,910	+ 128	Defer	1,272	- 508	1,274	1,274	- 508	3,270	3,270	+ 1,488
Ivanpah	827	523	684	- 143	806	806	- 21	313	803	- 24	523	684	- 143	1,089	1,089	+ 262
Jackson Tank	737	673	961	+ 224	673	961	+ 224	673	1,334	+ 597	673	961	+ 224	981	981	+ 244
Jump Canyon	2,177	1,281	2,643	+ 446	1,281	2,643	+ 446	Defer	2,933	+ 756	1,281	1,312	- 865	2,286	2,286	+ 109
Last Chance	2,170	824	824	- 1,346	1,235	1,235	- 915	Defer	1,054	- 1,116	824	824	- 1,346	2,734	2,734	+ 564
Littlefield Community	3,501	1,821	1,821	- 1,680	1,821	1,821	- 1,680	Defer	1,821	- 1,680	1,821	1,821	- 1,680	4,311	4,311	+ 810
Little Tank	662	575	669	+ 7	772	772	+ 110	575	793	+ 131	575	669	+ 7	623	623	- 39
Little Wolf	305	282	282	- 23	427	427	+ 122	Defer	282	- 23	282	282	- 23	640	640	+ 335
Lizard	168	210	367	+ 199	210	367	+ 199	126	471	+ 303	210	367	+ 199	178	178	+ 10
Lower Hurricane	4,815	4,815	5,330	+ 515	6,420	6,420	+ 1,605	4,815	6,202	+ 1,387	4,815	5,330	+ 515	5,193	5,193	+ 378
Mainstreet	8,333	6,690	9,115	+ 782	6,690	9,115	+ 782	4,014	10,427	+ 2,094	6,690	8,006	- 327	11,744	11,744	+ 3,411
Mesquite Community	2,568	2,153	2,153	- 415	2,153	2,153	- 415	Defer	2,153	- 415	2,153	2,153	- 415	2,809	2,809	+ 241
Mormon Well	326	525	525	+ 199	525	525	+ 199	Defer	525	+ 199	525	525	+ 199	434	434	+ 108
Mosby-Nay	1,155	648	727	- 428	648	727	- 428	Defer	727	- 428	648	727	- 428	1,202	1,202	+ 47
Mt. Trumbull	1,114	1,114	1,114	0	1,687	1,687	+ 573	668	1,114	0	1,114	1,114	0	1,894	1,894	+ 780
Mud and Cane Spring	4,883	2,834	4,741	- 142	3,779	4,254	- 629	Defer	4,748	- 135	2,834	3,826	- 1,057	5,130	5,130	+ 247
Mule Canyon	1,023	603	754	- 269	603	754	- 269	Defer	754	- 269	603	754	- 269	1,811	1,811	+ 788
Pakoon Spring	1,126	1,078	1,258	+ 132	1,078	1,078	- 48	862	1,193	+ 62	1,078	1,258	+ 132	1,261	1,261	+ 135
Parashaunt	3,292	3,292	4,194	+ 902	4,988	5,846	+ 2,554	1,975	4,669	+ 1,377	3,292	3,336	+ 44	3,708	3,708	+ 416
Pa's Pocket	1,034	507	812	- 222	760	972	- 62	507	958	- 76	507	600	- 434	1,361	1,361	+ 327
Penns Well	719	589	630	- 89	589	630	- 89	Defer	697	- 22	589	630	- 89	1,110	1,110	+ 391
Poverty Mountain	5,337	4,783	6,488	+ 1,151	4,783	6,488	+ 1,151	3,826	8,206	+ 2,869	4,783	5,421	+ 84	5,851	5,851	+ 514
Sullivan Canyon	1,232	938	1,357	+ 125	1,046	1,340	+ 108	Defer	1,357	+ 125	938	1,063	- 169	2,203	2,203	+ 971
Sullivan Tank	452	329	329	- 123	329	329	- 123	Defer	329	- 123	329	329	- 123	974	974	+ 522
Sunshine	996	907	1,475	+ 479	1,360	1,360	+ 364	816	1,487	+ 491	907	1,475	+ 479	1,218	1,218	+ 222
Tassi	1,087	2,292	2,292	+ 1,205	2,292	2,292	+ 1,205	Defer	2,292	+ 1,205	2,292	2,292	+ 1,205	1,188	1,188	+ 101
Toquer Tank	1,073	1,073	1,317	+ 244	1,073	1,317	+ 244	1,073	1,627	+ 554	1,073	1,317	+ 244	1,576	1,576	+ 503
Whiterock-Soapstone	1,259	1,259	1,259	0	1,259	1,259	0	755	1,259	0	1,259	1,259	0	1,120	1,120	- 139
Wildcat	8,052	3,371	4,539	- 3,513	5,055	6,169	- 1,883	Defer	4,586	- 3,466	3,371	3,425	- 3,466	9,653	9,653	+ 1,601
Wolfhole Canyon	2,980	2,851	3,534	+ 554	2,851	3,534	+ 554	1,710	3,736	+ 756	2,851	3,228	+ 248	4,479	4,479	+ 1,499
Wolfhole Lake	723	754	1,549	+ 826	1,131	1,732	+ 1,009	754	1,757	+ 1,034	754	947	+ 224	798	798	+ 75
Wolfhole Mountain	2,279	1,869	3,214	+ 826	1,869	3,214	+ 935	Defer	3,174	+ 895	1,869	2,361	+ 82	2,500	2,500	+ 221
TOTAL	81,094	61,807	83,590	+ 2,496	74,137	91,306	+10,212	28,878	90,809	+ 9,735	61,807	70,132	-10,962	105,226	105,226	+24,132
Less Intensive Management																
Iverson	36	36	86	+ 50	47	47	+ 11	36	148	+ 112	36	86	+ 50	36	36	0
Littlefield Free Use	129	108	103	+ 1	120	120	- 9	Defer	108	- 21	108	130	+ 1	160	160	+ 31
Mustang Spring	553	459	533	- 20	511	511	- 42	275	541	- 12	459	533	- 20	566	566	+ 13
Pakoon	987	989	989	+ 2	1,099	1,099	+ 112	593	593	- 394	989	989	+ 2	1,536	1,536	+ 549
Pat's Pond	61	61	83	+ 22	71	71	+ 10	61	114	+ 53	61	83	+ 22	69	69	+ 8
Purgatory	435	247	247	- 188	275	275	- 160	Defer	247	- 188	247	247	- 188	466	466	+ 31
Quail Canyon	307	312	402	+ 95	431	431	+ 124	232	373	+ 66	312	402	+ 95	311	311	+ 4
Rosenberry	172	172	259	+ 87	190	190	+ 18	172	364	+ 192	172	259	+ 87	172	172	0
Shelly	86	52	79	- 7	58	58	- 28	52	113	+ 27	52	79	- 7	106	106	+ 20
Snyder	80	62	129	+ 49	73	73	- 18	62	200	+ 120	62	129	+ 49	91	91	+ 11
TOTAL	2,846	2,498	2,937	+ 91	2,875	2,875	+ 18	1,483	2,801	+ 45	2,498	3,011	+ 91	3,513	3,513	+ 754
GRAND TOTAL	83,940	64,305	86,527	+ 2,587	77,012	94,181	+10,230	30,361	93,610	+ 9,780	64,305	73,143	-10,871	108,739	108,739	+24,886

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* Under Alternative 5 livestock grazing would be eliminated on Federal land, therefore, initial and 15-year stocking rates would be 0.

1/ Initial stocking rate

2/ Expected stocking rate after 15 years

3/ Difference between stocking rate after 15 years and present 5-year average licensed use

4/ Represents grazing preference; does not necessarily represent stocking level operators would utilize

5/ Shows difference between present 5-year average and active privileges; does not represent a gain from the 5-year average

TABLE 3-13
SUMMARY OF INITIAL ADJUSTMENTS IN LIVESTOCK AUMS FROM 5-YEAR AVERAGE

Size of Operation*	Proposed Action			Alternative 1			Alternative 2			Alternative 3			Alternative 4**			Alternative 5		
Group I	Allotments	Acres	AUMs	Allotments	Acres	AUMs	Allotments	Acres	AUMs	Allotments	Acres	AUMs	Allotments	Acres	AUMS	Allotments	Acres	AUMS
Intensive Management																		
Increases	2	16,538	73	6	51,606	1,127	1	12,341	31	2	16,538	31	8	135,700	1,472	0	0	0
Reductions	6	139,162	1,371	2	104,094	1,122	8	161,931	3,994	6	139,162	1,371	1	18,572	69	9	174,272	6,688
Less Intensive Mgmt.																		
Increases	1	8,573	5	3	9,536	145	0	0	0	1	8,573	5	5	27,589	87	0	0	0
Reductions	3	27,909	303	3	18,373	211	4	26,946	303	3	27,909	303	0	0	0	6	27,909	1,521
Group II																		
Intensive Mgmt.																		
Increases	2	135,736	1,404	3	165,547	1,979	0	0	0	2	135,736	1,404	13	457,825	4,534	0	0	0
Reductions	11	304,251	4,199	11	304,252	3,535	15	488,400	12,487	11	304,251	4,199	2	30,575	251	15	488,400	16,219
Group III																		
Intensive Mgmt.																		
Increases	0	0	0	3	99,077	465	0	0	0	0	0	0	8	220,681	5,868	0	0	0
Reductions	8	213,185	2,601	5	114,108	956	8	213,185	9,308	8	213,185	3,189	1	4,356	39	9	225,037	12,514
Group IV																		
Intensive Mgmt.																		
Increases	0	0	0	2	239,871	3,301	0	0	0	0	0	0	9	823,790	12,645	0	0	0
Reductions	7	583,919	12,593	7	583,919	8,434	8	774,375	26,478	7	583,919	12,593	0	0	0	9	823,790	45,573
Less Intensive Mgmt.																		
Increases	1	47,038	2	2	48,453	130	0	0	0	1	47,038	2	2	48,372	580	0	0	0
Reductions	2	1,334	52	2	1,334	35	3	48,372	429	2	1,334	52	0	0	0	4	51,121	1,325

*Herd size
Group I - Less than 75 head
Group II - 75 to 150 head
Group III - 151 to 300 head
Group IV - More than 300 head

**Represents the difference between the 5-year average and the active privileges

+No less intensive management operations do. These operations would continue to be run separately in the remaining pastures.

Intensely managed grazing would require livestock to somewhat change their grazing habits. Livestock would have to adapt to new terrain, water sources, increased concentrations, and more frequent handling and movement. Initially, the stress of this change would cause weight losses. As livestock adapt to the new systems, however, their performance would improve.

On allotments under less intensive management, livestock operations, grazing patterns, and handling procedures would remain essentially unchanged from the present. No allotments would be combined, and those presently operated in common would continue to be so. Season of use would not change except in the Purgatory Canyon allotment, where the grazing season would be shortened by 2 months in the spring. (See table 1-3.)

The no-action alternative would not affect existing livestock operations. Current grazing patterns would continue unchanged during the next 15 to 25 years. Sixteen allotments would continue to be managed under implemented AMPs. BLM would monitor and evaluate these allotments and revise their AMPs to meet resource management objectives. The remaining 47 allotments would continue to be managed less intensively.

The elimination of grazing on Federal land would drastically alter livestock operations in the EIS area. All operators somewhat depend on Federal lands for their operations, since privately owned lands cannot completely support operations. Nine operators have no source of income other than their livestock operations and would be forced to find other means of support. The remaining operations would be severely disrupted and would have to buy or lease other private or State lands. Some operators could buy from others and possibly build up economical livestock units. The number of operators that could stay in business cannot be determined, although as many as 40 or more of the 60 operations might be forced out of business.

Livestock Production Characteristics

The proposed action and alternatives 2 and 3 would generally allow more forage for each grazing animal than presently exists. The lower stocking rates, coupled with a grazing system, over time would improve range conditions and increase the more desirable forage species for livestock, increasing weight gains and calf crops and reducing death losses. Implementing grazing systems would further benefit livestock production, since operators would be handling, moving, or working livestock more regularly. They would, therefore, be able to better care for their animals, monitoring animal quality, breeding, and health.

The proposed action and alternatives 1, 2 and 3 call for implementing grazing systems and AMPs. Data from presently implemented AMPs in the EIS area show an average 15 percent increase in calf crops and an average 5 percent increase in calf weaning weights over production before AMP implementation. Under AMPs, death losses have been cut by 25-50 percent. For example, death losses have declined from a high of 6 or 7 percent of the herd to an average of 4 percent. Similar results can be assumed under proposed intensive management systems.

Allotments under implemented AMPs would use rest-rotation and deferred rotation grazing systems. Heady (1975) reported that rest-rotation systems have been used widely and successfully in range reclamation and can be expected to increase livestock production. Deferred rotation systems, on the other hand, tend to cause smaller gains in livestock performance, since livestock graze all pastures in an allotment each year. In the EIS area rest-rotation grazing is proposed for 26 allotments (9 presently implemented) containing 1,253,076 acres of Federal land. Deferred rotation systems are proposed for 14 allotments (7 presently implemented), containing 382,590 acres of Federal land.

Table 3-14 summarizes the anticipated livestock performance impacts of the proposed action and of alternatives.

Proposed Action

In most cases under the proposed action initial stocking rates would be lower than at present, allowing more forage per animal and improving livestock condition. The vegetation treatments under this proposal would significantly improve livestock performance. Vegetation treatments on allotments under implemented AMPs have helped stimulate calf production. The seedings have provided quality forage, producing healthier brood cows and bulls and increasing calf crops and weights. Calf crops are expected to increase by an average of 15 percent, and weaned calf weights are expected to increase by an average of 10 percent or 35 pounds per animal. Over the long term the proposed action would provide maximum benefits to calf production, livestock performance, and the number of livestock on the range.

TABLE 3-14

SUMMARY OF ANTICIPATED LIVESTOCK PERFORMANCE IMPACTS*

Livestock Production Characteristics	Proposed Action	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Percent Calf Crops	Increase 15%	Increase 5%	Increase 15%	Increase 10%	Decrease 10%
Weaned Calf Weights	Increase 10-35% lbs	Increase 5%-17 lbs	Increase 10%-35 lbs	Increase 8%-28 lbs	Increase 15%-52 lbs
Animal Death Loss	Decrease 25%	No Change	Decrease 25%	Decrease 20%	Increase 50%
Cull Cow Weights	Increase 8%-72 lbs	Increase 3%-30 lbs	Increase 10%-90 lbs	Increase 5%-45 lbs	Decrease 10%-90 lbs

*Data based on interviews with several livestock operators in the EIS area and follow-up reports sent to all operators in the EIS area for verification or correction.

Alternative 1 — Full Stocking

Under the full stocking alternative allotments would be stocked at the full livestock carrying capacities, and no reductions would be made for rest pastures. On 17 allotments the stocking rate could exceed the 5-year average; on 30 others it would be less. Initial stocking rates would be higher than those under the proposed action, with 14 exceptions. The higher stocking rates would allow less forage per grazing animal. Over the long term livestock performance would decline, involving a loss in calf crops, weight gains, and numbers of animals on the range. This decline would be slight compared to the existing situation but significant compared to production under the proposed action.

On allotments proposed for deferred rotation, initial stocking rates would be the same under the full stocking alternative as under the proposed action. Deferred rotation would increase livestock production but not as much as would rest rotation. The increases resulting from the deferred systems would be offset by the decreases occurring on the fully stocked, yearlong use allotments. As a result, average long-term livestock production would either remain the same or slightly decrease from the present.

Alternative 2 — Stocking by Condition Class

Under the stocking by condition class alternative initial stocking rates would be reduced 51 percent from those of the proposed action and 65 percent from the 5-year average licensed use. Livestock performance would improve much as it would under the proposed action. Performance, however, would improve at a rate faster than under the proposed action because of initial low stocking levels and an average 30 percent utilization of forage over the EIS area. Calf crops would increase by an estimated 15 percent, and calf weaning weights would increase by an estimated 10 percent (averaging 35 pounds per animal). Livestock and forage conditions would improve over the long term, allowing more livestock on the range. An estimated 9,670-AUM increase of forage would occur over present 5-year average licensed use.

Alternative 3 — No Vegetation Manipulation

Under alternative 3 livestock performance would be slightly below that expected under the proposed action. Alternative 3 provides for no vegetation treatments or seedings, and consequently livestock production on some allotments would increase only slightly. After 15 years this alternative would result in the production of 73,143 AUMs of forage in the EIS area as compared to 86,527 AUMs under the proposed action (see table 3-12). Calf crops would increase by an average of 10 percent, and weaning weights would increase by an average of 8 percent (28 pounds).

Alternative 4 — No Action

Under the no-action alternative livestock performance and production would remain at about the present level or would slightly decline under year-to-year climate-caused fluctuations. Under present range conditions, percent calf crops would decline by an average estimated 15 percent or 52 pounds per animal. Cull cow weights would decline 10 percent or 90 pounds per animal. Death loss would increase by an esti- would decline 10 percent or 90 pounds per animal. Death loss would increase by an estimated 50 percent, from the present average of 6 percent to 9 or 10 percent of the herd.

The deterioration of performance would depend on the amount of cattle being run in the EIS area. Since operators would have the option of stocking up to their active privileges, as livestock numbers increase above the present 5-year average use, livestock production and performance would decrease accordingly.

Range Improvements

The proposed action and alternatives 1, 2, and 3 would require extensive improvements to implement intensive management. Alternative 3 would involve no vegetation treatment, but otherwise the same type and number of fences, water developments, and roads would be required for each of these four alternatives.

Constructing and developing range improvements would increase operator workloads and expenses. These additional costs would be a relatively short-term impact, but increased maintenance costs would amount to a long-term impact. Better distribution of livestock resulting from new waters and fencing would provide additional benefits in improved livestock performance.

Intensive livestock management requires more work by the operators to move livestock regularly as called for by the grazing systems. Since about 70 percent of the operators in the EIS area manage their units on a part-time basis, many might not have the time for the additional required work. By spending more time supervising their livestock operations, however, licensees could better care for their animals.

Alternative 4 (no action) would require few range improvements. On allotments under implemented AMPs, range improvements needed to meet AMP resource management objectives would be completed. Such improvements would include land treatments, fencing, and water developments. The only other authorized range improvements would be those needed to maintain and replace existing projects and those needed for the orderly use of the range, such as allotment boundary fences and cattleguards.

Under alternative 5 no range improvements would be required for livestock operations, since grazing would be eliminated. Extensive fencing would be needed to separate private and State lands from public lands to control trespass. Approximately 423 miles of boundaries would have to be surveyed and fenced. Existing range improvements on public lands that do not benefit or support multiple-use management would be removed and surface disturbance rehabilitated. BLM or the operator would do the work, depending on whether the project is under cooperative agreement or Section 4 permit.

RECREATION

BLM recreation specialists evaluated existing and proposed designated areas to assess the long-term impacts of the proposed action and alternatives. Since specific project locations are unknown and boundaries of recreation sites do not coincide with allotment boundaries, they assumed the greatest possible impact — that all proposed projects are constructed outside the recreation sites.

Table 3-15 summarizes the results of this analysis. Less significant impacts than those shown on table 3-15 would also occur. Implementing proposed grazing systems, for example, would generally improve sightseeing by decreasing livestock numbers and increasing vegetation density and species composition. Similarly, certain improvements, such as pipelines, might impart significant short-term impacts but have less serious long-term impacts because of natural processes or mitigation. Thus, all less-than-moderate adverse or beneficial impacts are excluded.

Both the grazing management systems and proposed range developments were evaluated to determine whether they would preserve areas in a natural condition or restore the values for which the areas are to be established or were established.

The varying degrees of impact were defined as follows:

Moderate Impact — The action would beneficially or adversely change the quality of the natural values for which the area was or is to be established.

High Impact — The action would have an adverse impact sufficient to eliminate those natural values for which the area was or is to be established or a beneficial impact sufficient to restore or preserve the natural values for which the area was or is to be established.

Range developments also were evaluated to determine whether their function would affect the quality of the natural values. This evaluation revealed that land treatments and those developments supplying water to livestock would most seriously affect natural values.

Livestock severely deplete forage within a 250-foot radius of water sources and less severely deplete forage within an additional 450-foot radius. Livestock grazing would change plant composition and density, increase erosion potential, and jeopardize the scenic, scientific, and educational value of approximately 35 acres around each water source.

Constructing 129.3 miles of new fences would have a moderately adverse impact on off-road vehicle (ORV) travel throughout the EIS area. Cross-country travel in areas designated as open would be restricted, forcing ORV operators to deviate from their route to a gate or cattleguard. Building 27.2 miles of new roads, however, would partially offset this restriction by opening areas presently lacking roads. Implementing the proposed action by creating or restricting access overall could have a moderate adverse effect on ORV designations by minimizing use areas existing at the time of designation.

Recreation Uses and Amounts

Each recreational activity identified in BLM's Recreation Inventory System was evaluated to determine whether the proposed action would beneficially or adversely affect its quality rating, recreation opportunity, or visitor use. Overall, the long-term effects of the proposed action would benefit recreation. Table 3-16 summarizes the significant long-term impacts of the proposed action and its alternatives on the more important recreation activities within the EIS area.

TABLE 3-15
LONG-TERM IMPACTS OF PROPOSED ACTION ON EXISTING AND PROPOSED DESIGNATED AREAS

Area Impacted	Allotment	Action	Units	Impact	Comment
Existing					
Paiute Primitive Area	Littlefield Sullivan Canyon	Water Developments	2 each	M-	35 acres of depleted forage around each water development would be a substantial impact in an area established to preserve aesthetic, primitive qualities.
Virgin River Gorge Recreation	Blake Pond	Water Developments Discing/Plowing/ Seeding	2 each	M- M+	Lands were withdrawn to protect scenic values. The visual quality of 35 acres around each water development would be seriously jeopardized. Land treatments, including discing, plowing, and burning would impart severe, adverse, short-term impacts on scenic quality, but in the long run would be moderately beneficial by stimulating a more luxuriant growth of vegetation, especially if reseeded.
	Wolfhole Mountain	Burning	2,800 acres	M+	
	Cedar Wash	Seeding	8,920 acres	M+	
	Littlefield Community	Water Development	2 each	M-	
Proposed					
Environmental Study Areas					
1) Paiute Primitive Area	Littlefield Community	Water Development	2 each	M-	Same impacts as for Paiute Primitive Area.

Design restrictions and BLM policy prevent all of this.

TABLE 3-16
LONG-TERM IMPACTS ON RECREATION

PROPOSED ACTION

Activity	Quality	Opportunity	Visitor Use	Comment
Hunting				
Big Game	M+	M+	M+	Improved forage conditions and new water sources would aid antelope and mule deer populations, thereby improving hunting quality and opportunity. Visitor use would also increase. Bighorn sheep and livestock are not compatible and therefore quality, opportunity, and visitor use would remain at present levels.
Small game	M+	M+	M+	Small-game hunting involves waterfowl, for which impacts should be insignificant.
Sightseeing				
Archaeology	M-	M+	L+	Intrusions within view of an archaeological site would lower the quality of sightseeing. Constructing an additional 27.2 miles of roads would improve access to sites, but improved access would increase vandalism, decrease resource values, and reduce quality significantly. Visitor use would increase slightly.
Primitive Experiences	M-	M-	L-	Intrusions such as catchments and roads would degrade primitive values but would only slightly affect present low visitor use.
Off-Road Vehicle Use	M-	L+	L+	Constructing an additional 27.2 miles of roads would slightly improve the opportunity for ORV use. Visitor use would remain low but increase slightly, whereas quality of the recreation experience would decline from low-visibility fence hazards and 129.3 miles of new fences. No new roads would be contructed in closed areas.

ALTERNATIVE 1--FULL STOCKING

Activity	Quality	Opportunity	Visitor Use	Comment
Hunting				
Big Game	M-	M-	M-	Full Stocking at the estimated carrying capacity for each allotment would result in more than a 50% average utilization and more cows grazing smaller areas. The higher the average utilization, the greater the conflicts with both small and big game. Thus, the quality of and opportunity for hunting would be moderately adversely impacted. Visitor use would be impacted to a degree corresponding to the decline in quality and opportunity.
Small Game	M-	M-	M-	
Sightseeing				
Archaeology	M-	M+	L+	Long-term impacts would be the same as under the proposed action.
Primitive Experiences	M-	M-	L-	Long-term impacts would be the same as under the proposed action.
Off-Road Vehicle Use	M-	L+	L+	Long-term impacts would be the same as under the proposed action.

TABLE 3-16 (continued)

ALTERNATIVE 2--STOCKING BY CONDITION CLASS

Activity	Quality	Opportunity	Visitor Use	Comment
Hunting				
Big Game	M+	M+	M+	Significant short-term benefits would accrue from deferring for as long as 5 years grazing on ranges in poor or fair condition. Wildlife populations should respond to the improved forage conditions. In the long term, however, stocking levels and management intensity should attain the same results as expected under the proposed action, and the impacts of the proposed action and this alternative would be identical.
Small Game	M+	M+	M+	
Sightseeing				
Archaeology	M-	M+	L+	Long-term impacts would be the same as under the proposed action.
Primitive Experiences	M-	M-	L-	Long-term impacts would be the same as under the proposed action.
Off-Road Vehicle Use	M-	L+	L+	Long-term impacts would be the same as under the proposed action.

ALTERNATIVE 3--NO VEGETATION MANIPULATION

Activity	Quality	Opportunity	Visitor Use	Comment
Hunting				
Big Game	M+	M+	M+	Implementing all provisions of the proposed action except land treatment would moderately benefit big game, thereby enhancing hunting. Eliminating land treatment, however, would continue to decrease diversity of small game. Impacts would depend somewhat on the areas treated. Land treatments in pinyon-juniper stands would benefit small game, but treatment in sagebrush and blackbrush areas would destroy the shrub layer, used as cover by small game.
Small Game	M-	M-	M-	
Sightseeing				
Archaeology	M-	M+	L+	Alternative 3 would have the same impacts as the proposed action, but eliminating land treatment would permit fewer potential intrusions near archaeological sites. Other intrusions, such as catchments, fences, and reservoirs, would have impacts similar to land treatment.
Primitive Experiences	M-	M-	L-	Eliminating large areas of land treatment would preserve the quality of and opportunity for primitive experiences, but this alternative would not alter the impacts of fences and water developments on primitive experiences. Thus, impacts on primitive values would be the same as under the proposed action.
Off-Road Vehicle Use	M-	L-	L+	Sightseeing quality as part of the ORV experience would improve by eliminating land treatment intrusions. Other considerations, however, such as challenging opportunities, are as important to the ORV experience as scenic quality. The elimination of land tratment is not sufficient to alter the impacts of other proposed projects, such as water developments and fences. The impacts of alternative 3 on existing ORV use would be the same as impacts under the proposed action.

TABLE 3-16 (continued)

ALTERNATIVE 4--NO ACTION

Activity	Quality	Opportunity	Visitor Use	Comment
Hunting				
Big Game	L-	L-	L-	Wildlife populations are slowly and steadily declining from a loss of vegetation species. Continuing existing practices and levels would perpetuate this decline for both big and small game.
Sightseeing				
Archaeology	M-	M-	M-	Continuing range management levels and practices would allow further vandalism, looting, and deterioration of archaeological sites, moderately reducing visitor use and the quality and opportunity for sightseeing.
Primitive Experiences	L-	L-	L-	Primitive values would continue to gradually decline as a result of the present intensity of livestock management.
Off-Road Vehicle Use	L-	M+	L+	Roads and trails to new range developments and cross country would continue to be created, slowly enhancing long-term ORV opportunities. Present low visitor use would continue but might slightly increase.

ALTERNATIVE 5--ELIMINATION OF GRAZING

Activity	Quality	Opportunity	Visitor Use	Comment
Hunting				
Big Game	M+	M+	M+	Eliminating grazing would improve vegetation species, composition, and diversity, benefit both big- and small-game populations, and moderately improve hunting quality, opportunity, and visitor use. The 423 miles of new fencing would be a hazard to big game but would be offset by the removal of as much as 931 miles of existing fence.
Small Game	M+	M+	M+	
Sightseeing				
Archaeology	M+	M-	L-	Removing roads and range developments not benefiting multiple-use management would reduce access to remote areas and reduce vandalism to sites. The quality of sightseeing would improve in the long term. Less access, however, would reduce opportunity and visitor use.
Primitive Experiences	M+	M+	L+	Removing existing man-made intrusions would significantly improve primitve values. Opportunity would increase by creating larger areas with less evidence of intrusion.
Off-Road Vehicle Use	M-	M-	L-	Removing roads and installing 423 miles of new fences would restrict vehicular access, adversely impacting quality, opportunity, and use. Impacts of new fence construction would be offset by removing 931 miles of existing fences.

Economic Impacts

Outdoor recreation is important to the economy of the EIS area and environs, and any proposal that enhances or reduces visitor use of the EIS area would impact the economy of nearby communities. The degree of impact, however, would vary with the recreation activity. Big-game hunting, for example, adds an estimated $20 to $25 per visitor day to the local economy. Sightseeing, on the other hand, contributes relatively little to the local economy.

BLM has calculated the economic impact of projected changes in outdoor recreation in the EIS area, assuming $10 to approximate the average expenditure per visitor day within the area and on the basis of a total of 122,287 visitor days spent in outdoor recreation in the EIS area in 1975. The proposed action would moderately benefit recreation, bringing approximately $122,287 into the local economy (122,287 visitor days × 10% × $10 per visitor day = $122,287). Additional and secondary benefits might also be generated through increased taxes and jobs.

Under alternative 1, more livestock would be permitted on a smaller area, moderately deteriorating recreation resources. Soil erosion would increase, and vegetation would decline, diminishing scenic quality throughout the EIS area. Erosion of fragile soils would limit ORV use. Reduced wildlife populations and diversity would limit opportunities to view and hunt wildlife. Opportunities for high quality sightseeing, hiking, and camping would also be jeopardized. A moderately adverse impact would result in a loss of $122,287 from decreases in recreation visitor use.

The impact of stocking by condition class on recreation would differ from the proposed action only in the time over which the AMPs would be implemented. In the short term, deferments and immediate reductions in stocking levels would improve range condition faster than would the proposed action. In the long term the impacts of this alternative would be the same as those under the proposed action.

This alternative would also have other significant short-term impacts. Immediate reductions in stocking levels in the short term would improve scenery in direct proportion to the amount and the length of the period of reduction. Wildlife numbers would increase, creating additional short-term opportunities for hunting and wildlife observation. Building range developments under this alternative would destroy the same primitive values as would the proposed action.

Alternative 3, no vegetation manipulation, would have the same long-term impacts as the proposed action, excluding impacts of land treatment. Soil erosion would be less than under the proposed action, since land treatment would not disturb large areas of vegetation cover. On the other hand, this alternative would forego the enhancement to scenery resulting from seeding following land treatments. Continued grazing pressure and the forage lost from anticipated land treatment would increase the fence line contrast between grazed and rested pastures. In the long term this alternative would have a moderately adverse impact on outdoor recreation, with an accompanying loss of $122,287 in recreation-associated economic benefits.

Continuing present management on allotments not under AMPs would further deteriorate recreation resources and limit future options for almost all types of outdoor recreation. Vegetation decline on non-AMP allotments and continued soil erosion in areas of poor soil condition would lower aesthetic qualities and decrease opportunities for hunting, sightseeing, hiking, and camping. Erosion of fragile soils would limit ORV use. Reductions in wildlife diversity and maintenance of low population levels would limit hunting and opportunities to view wildlife. A low adverse impact (assumed to reduce visitor use by 50 percent) would result in the loss of $61,142 in recreation-associated economic benefits.

BLM would not provide the necessary intensive support for areas possessing high quality primitive values, leaving them inadequately protected. Range developments in the AMP allotments and regression from natural conditions would degrade primitive values by reducing vegetation cover, changing species composition, and increasing soil erosion and compaction.

Alternative 5, elimination of grazing, would enhance outdoor recreation in the EIS area. Sightseeing and camping would increase with the improvement in scenery and in the quality of the range. Wildlife would benefit from the elimination of competition, increasing to natural pregrazing levels. Thus, hunting and wildlife viewing opportunities would improve. The removal of range improvements and the overall improvement in range condition would enhance primitive experiences. An economic benefit of $122,287 would be realized if this alternative is implemented.

The removal of 931 miles of fences would somewhat offset the 423 miles of required new fences. The new fencing would alter recreation patterns, particularly those of the ORVs, and restrict access to tracts of public lands next to State and private lands. Fencing would also degrade primitive and open space values and interfere with big-game movements, thereby degrading hunting and sightseeing.

WILDERNESS

The Department of the Interior's wilderness interim management policy is to continue multiple use and to preserve the wilderness potential of areas designated for wilderness study (map 2-9). This policy applies from October 21, 1976 until (1) Congress declares an area unsuitable for wilderness, or (2) the inventory process determines that an area lacks wilderness characteristics. In either case, other types of multiple-use management can proceed. Thus, to avoid jeopardizing existing wilderness qualities, some developments identified in the proposed action and its alternatives will be delayed pending the required wilderness inventory and review and congressional action.

Although grazing is permitted within wilderness areas, certain developments supporting grazing might be prohibited: reservoirs, pipelines, roads, and fences. The impact of fences, for instance, in a potential wilderness area might be easily mitigated should the area be designated wilderness. In that case, fences would have a low adverse long-term impact on wilderness values. Roads, on the other hand, more permanently disturb soil, drainage, and vegetation, having impacts that cannot be as easily mitigated. Although a road might be removed from use, scarified, and reseeded, the existence of that road might be apparent for many decades. Road construction, then, might have a highly adverse impact on wilderness values and would not be permitted in a wilderness study area.

Since interim management does not permit developments that would disturb wilderness values, no projects having significant impacts, whether in the proposed action or one of its alternatives, would be permitted until an area is removed from interim management.

Alternative 5, elimination of grazing, would moderately benefit wilderness resources by removing and rehabilitating some existing range developments. Fencing of State and private land (423 miles) would be offset by the removal of approximately 931 miles of existing fences.

ECONOMIC AND SOCIAL CONDITIONS

This section quantifies information for the areawide impacts to income, employment, and tax base and discusses the impacts of the proposed action and its alternatives on social attitudes and values of the two major groups concerned with land use in the EIS area. Site-specific impacts to individual operations cannot be quantified because of a lack of site-specific financial data, but the impacts to four representative ranch operations are analyzed. From this analysis, generalizations to other impacted operations are drawn. The population, income, and employment generated by ranch operations in the EIS area have only minimal impacts on the North Rim SEPA. Table 3-17 presents areawide long-term economic impacts of the proposed action and its alternatives.

Population Characteristics

The proposed action would only minimally impact population, since population changes are likely to result from growth in the economic base of the area rather than from the proposed action or proposed alternatives.

Employment

The short-term loss of ranch employment under the proposed action and alternatives 1, 2, and 3 from the reduction in AUMs would be insignificant for the SEPA. As the range improves, this employment loss would be restored under the proposed action and alternatives 1 and 2. Construction of range improvements would temporarily increase area employment.

The greatest impact on employment would result from the elimination of grazing on Federal lands (alternative 5). An estimated 355 persons in the SEPA depend directly or indirectly on EIS-area livestock grazing for employment and income (including dependents of workers). The extent of dependency for these people, however, is not known, since a large percentage of the operators that would be impacted by this alternative have other income sources. Agricultural employment represents about 8 percent of the SEPA employment, but the potential decline in ranch employment represents less than 1 percent of the SEPA's employment.

Alternative 4 (no action) would not affect employment.

TABLE 3-17
AREAWIDE ECONOMIC AND SOCIAL IMPACTS

	Unit	Present Status	Proposed Action	Alternative 1 Full Stocking	Alternative 2 Stocking by Condition Class	Alternative 3 No Vegetation Manipulation	Alternative 4 No Action	Alternative 5 Elimination of Grazing on Federal Lands
Economic Impacts								
Short term areawide impact from changes in livestock income	$ change	-	-184,400	-84,000	-503,000	-184,400	No change	-717,000
Areawide income change as a percent of SEPA income		.01	.006	.001	.008	.006		.01
Long term areawide impact from average annual changes in livestock income (15 years after implementation)	$ change	-	+300,000	+64,000	+457,000	-61,000	-323,000	-717,000
Areawide income change as a percent of SEPA income		.01	.005	.001	.007	.001	.005	.01
Short term BLM revenue		-	- 37,100	-13,100	-101,300	-37,100	No change	-158,700
Long term BLM revenue	$ change from present	-	- 11,000	+ 3,900	+ 1,200	-33,300	No change	-158,700
Social Conditions								
Short term attitudes and values		Conflict between different publics and BLM	Increase in conflicts	Increase in conflicts	Increase in conflicts	Increase in conflicts	Continued conflict between different publics and BLM	Significant increase in conflicts
Long term attitudes and values		Conflict between different publics and BLM	Decrease in conflicts	Decrease in conflicts	Decrease in conflicts	Decrease in conflicts	Continued conflict between different publics and BLM	Significant increase in conflicts
Short term rancher lifestyle		Existing lifestyle (see affected environment)	Lifestyle moderately jeopardized	Lifestyle somewhat jeopardized	Lifestyle significantly jeopardized	Lifestyle somewhat jeopardized	No change	Lifestyle significantly jeopardized
Long Term rancher lifestyle		Existing lifestyle (see affected environment)	Lifestyle somewhat jeopardized	Lifestyle somewhat jeopardized	Lifestyle moderately jeopardized	Lifestyle somewhat jeopardized	No change	Lifestyle significantly jeopardized

Income

This section estimates areawide income impacts to the SEPA. Its analysis averages the net effect of increases in livestock income over 50 years (assumed to be the life of the proposed action and alternatives after implementation), discounting the net effect of future income changes to convert their values to present dollars. The net average annual income impact to the area includes the multiplier effect.

Modern income analysis shows that certain changes in local production will cause changes by a multiplitive amount—by an amount greater than the initial change. The income multiplier used here is a "Keynesian" type, based on the propensity to locally consume local production. The multiplier was estimated for the North Rim SEPA by BLM's Socio-Economic Data System.

The total income (including multiplier effect) from livestock operations in the ES area amounts to 1 percent of SEPA earnings. Table 3-17 presents short-term (first year) impacts and the long-term average annual change in income by alternative. Table 3-17 also relates the change in income to the total income for the SEPA.

Under the proposed action and alternatives 1 (full stocking), 2 (stocking by condition class), and 3 (no vegetation manipulation) ranch income would decline in the short term because of the initial decrease in forage available to livestock. After the implementation of any of these alternatives, annual income would increase with an increase in AUMs and with improvements in livestock performance. (See table 3-14, Summary of Anticipated Livestock Performance Impacts.) The net effect of livestock income changes has been averaged over a 50-year period—the assumed life of the proposed action—and then discounted.

The largest long-term adverse impact to area income would occur under alternative 5, elimination of grazing on Federal lands. AUMs on Federal lands in the EIS area produce an estimated annual $717,000 of direct and indirect income for the SEPA (1 percent of the SEPA's total income), which would be eliminated under alternative 5.

Alternative 2 (stocking by condition class) would produce the largest average annual long-term income increase—$457,000, an increase of less than 1 percent of the SEPA's total income. The initial loss of income would be high—$503,000 under this alternative, but the range is expected to recover rapidly and livestock production would increase.

In the long term, average annual livestock forage expected under alternative 3 (no vegetation manipulation) would not increase, because livestock forage and performance changes would not be great enough to offset the initial reduction in AUMs.

The no-action alternative would not adjust livestock AUMs and, as a result, the range condition on some allotments would decline, decreasing livestock income and performance over time.

Government Revenues

Since livestock operations in the EIS area form an insignificant part of Mohave County revenues, the impacts of the proposed action and its alternatives on county revenues have not been estimated.

The estimated long-term changes in BLM revenue are presented in table 3-17, Areawide Social and Economic Impacts. The greatest change in revenues would occur under the elimination of grazing alternative, since all of BLM's revenues would be lost.

Ranch Economics

The initial adjustment to livestock stocking rates would financially burden many operators. The extent of this burden would depend on the existing economic condition of the operation, rancher options (such as grazing other land in Utah to compensate for lost AUMs), and the general economic situation, since many ranchers subsidize their operations. The lack of financial data on individual operations and on the availability of additional lands to compensate for reduced AUMs allows only an analysis of impacts by representative ranch size. To understand the impact to actual operations, see table 3-12 (Anticipated Stocking Rates) for information on livestock adjustments and future anticipated increases in AUMs.

Table 3-18 presents an economic assessment of livestock operations by representative ranch size for the proposed action and its alternatives.

The estimated change in ranch income is based on the assumption that the representative ranch operation would adjust its herd size in response to an adjustment in AUMs. (Table 2-25 shows the income statement for four representative ranch sizes.) The adjustment in variable costs and returns is based on the change in herd size expected without a change in fixed costs. It is assumed that representative operations expecting a future increase in forage would build

TABLE 3-18
ECONOMIC ASSESSMENT OF LIVESTOCK OPERATIONS BY SIZE

Representative Ranch Size (AUs)	Existing Situation	Proposed Action	Alternative 1 Full Stocking	Alternative 2 Stocking by Condition	Alternative 3 No Vegetation Manipulation	Alternative 4 No Action*	Alternative 5 Elimination
		Mean % Change in Livestock AUMs Initial Adjustment					
70		-18	+ 2	-56	-20	no change	100
116		-17	-10	-77	-17	no change	100
224		-24	- 2	-74	-24	no change	100
651		-27	-11	-58	-28	no change	100
		Mean % Change in Livestock AUMs 15 Years after AMP Implementation					
70		+4	+14	+11	- 3	no change	100
116		-8	+ 4	+ 2	- 9	no change	100
224		+3	10	+ 7	-14	no change	100
651		+4	+15	+15	-17	no change	100
		Net Ranch Cash Income after Initial Adjustment in Livestock AUMs					
70	$ 600	$ 100	$ 600	-$ 1,000	$ 20	$ 600	- $2,200
116	3,800	1,600	3,700	- 1,500	2,600	3,800	- 3,120
224	400	-2,400	200	- 8,400	-2,400	400	- 11,500
651	31,700	19,700	27,700	6,000	19,300	31,700	- 12,600
		Net Ranch Cash Income 15 Years after AMP Implementation					
70	$ 600	$3,800	$ 1,000	$ 4,300	$ 2,500	-$ 1,400	-0-
116	3,800	7,400	3,600	8,700	5,200	400	-0-
224	400	8,700	1,600	10,400	3,400	- 5,600	-0-
651	31,700	53,200	38,300	54,900	34,300	17,300	-0-

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* Assumes operations continue to use same number of AUMs as 5-year average

up their herds, and variable costs were adjusted on the basis of that change. Moreover, since livestock performance factors (i.e. calf weights and calf crops) are expected to improve under different alternatives, receipts were adjusted to reflect these changes. (See table 3-14 for anticipated livestock performance impacts.)

The initial adjustment in AUMs would have similar initial impacts under the proposed action and alternative 3 (no vegetation manipulation). The adjustment would reduce net ranch cash income for all ranch sizes, the 224-AU ranch size being hurt the most with a negative cash flow of $2,400. With a negative cash flow, an operator could not pay for his living expenses and would need other funds to support his operation. In the long term under both the proposed action and alternative 3, net ranch cash income would increase for each ranch size. The proposed action, however, would provide greater benefits than alternative 3. Livestock forage would increase more under the proposed action, and improvements in livestock performance would be greater.

Alternative 1 (full stocking) proposes less initial adjustment in AUMs than the proposed action and alternatives 2, 3, and 5. The 116-AU and 651-AU ranch sizes would be impacted the most, but reductions in net ranch income would still allow these operations to have a positive cash income. In the long term, net ranch cash income is expected to increase for each ranch size, but the increase would not be as great as under the proposed action or alternative 2.

The initial adjustment in livestock stocking rates under alternative 2 (stocking by condition class) might force some operators to sell their operations. All four representative ranch sizes would experience large losses in net ranch cash income, and the 70-AU, 116-AU, and 224-AU ranch sizes would have a negative cash income. The operations most hurt by this alternative would be those where grazing would be deferred (see table 3-12 for the allotments involved). In the long term, however, the resulting net ranch cash income for each operation size would be higher than under any other alternative proposed. This increase would result from the rapid increases in forage and livestock production.

Alternative 4 (no action) would have no initial impact on net ranch cash income, since it would not require reductions in stocking rates. On the other hand, in the future, net ranch cash income is expected to decrease over the present income because of expected decreases in livestock production.

Alternative 5 (elimination of grazing on Federal lands) is expected to have the greatest impact on representative ranch operations. The net ranch cash income after initial adjustment in livestock AUMs is presented in table 3-18. The 70-AU operation would lose $2,200, and the large ranch size (651 AUs) would lose $12,600. This alternative would decrease the total number of livestock operators in the EIS area and would economically hurt all operators. The number of operations able to stay in business is not known. Some operators would buy or lease other AUs, whereas many operators would sell the remaining parts of their operations. Under the assumption that the four representative ranches would sell out, there would be no net ranch cash income 15 years after implementation.

SOCIAL ATTITUDES AND VALUES

This discussion of social attitudes and values is based on generalizations obtained from interviews with ranch operators and with those familiar with the two interest groups and on information from BLM's Grand Wash Planning Area Analysis.

The proposed action and alternatives would not change the values held by the rancher or urban resident group, but they would affect attitudes and expectations toward BLM. The changes expected under the proposed action and alternatives 1, 2, 3, and 5—increases in recreation opportunities, the allocation of AUMs for wildlife, and the protection of cultural resources—would meet many of the urban group's expectations for the proper use of public lands.

On the other hand, two components of the proposed action and alternatives 1, 2, and 3 would worsen the ranchers' already negative attitudes toward BLM:

- Implementing AMPs as representing multiple use of public lands and
- Proposed changes in stocking rates.

The multiple-use concept threatens the operator's values of independence and his traditional use of the land. The change in management required to implement AMPs also threatens the operator's value of independence and traditional methods of operation.

The changes in stocking rates might cause economic losses for some operators, both in ranch income and in the ability to borrow money. Some operators might be forced to sell their operations, to seek other ways to earn a living, and to maintain a different lifestyle elsewhere. The operator would be likely to view any change in lifestyle as a lowering of his total well-being.

Many operators believe that, since they are barely making ends meet on their operations, any cut in stocking rates would force them to sell or further subsidize their operations. Operators also have expressed the belief that operators without debt have the best chance of staying in business and surviving a reduction in AUMs.

In the long term, the proposed action and alternative 1, 2, and 3 would still have an adverse but somewhat lessened impact on rancher attitudes. In the future the economic situation of livestock operations would improve because of a more stable forage supply and the improvements in the quality of existing AUMs. Any improvements in the livestock operation's economic situation would improve the likelihood of the operator maintaining his lifestyle. Operators forced to leave ranching because of the initial adjustment in AUMs would not benefit from future anticipated improvements in livestock income.

The ability of operators to keep their operations would be highly threatened by the stocking by condition class's large initial reductions in stocking rates. To the extent that this alternative would cause more operators to sell out and change their lifestyles, it would promote more negative feelings toward BLM.

Alternative 3 (no vegetation manipulation) would have social impacts similar to the proposed action, although long-term increases in forage would not be as great as expected under the proposed action. Lower forage increases and less livestock performance improvement would keep increases in ranch income below that expected under the proposed action and alternative 2.

Alternative 1 (full stocking) does not propose as large an adjustment in AUs as the proposed action. Fewer operators might be forced to leave ranching, and the lifestyles of fewer ranchers would be threatened. Future forage increases, however, would not be as great as under the proposed action.

Alternative 4 (no action) would create fewer conflicts for the rancher group but would not meet such needs of the urban group favoring increases in recreational opportunities and allocation of AUMs for wildlife.

Alternative 5 (elimination of grazing on Federal lands) would worsen already-negative attitudes toward BLM and the Federal government. The adjustment to the elimination of grazing would cause economic hardship for operators and threaten their ability to keep their operations and maintain their lifestyles.

See table 3-17 for a summary of long-term impacts of the proposal and its alternatives.

MITIGATING MEASURES

The measures listed in table 3-19 would reduce or eliminate adverse impacts identified in chapter 3. All measures are considered feasible under existing technology and will be required if the proposed action is approved.

The resources not listed in table 3-19 would have no mitigatable impacts. Impacts identified in chapter 3 that cannot be mitigated are discussed in the following section.

UNAVOIDABLE ADVERSE IMPACTS

Unavoidable adverse impacts are the adverse impacts of the proposed action that would not be mitigated. Such impacts are often referred to as "residual" impacts. They are unavoidable mainly because either (1) the proposed action directly conflicts with a value or values or (2) the cost of mitigation would be prohibitively high.

SOILS

Unavoidable adverse impacts on soil would result from the development of new waters and from land treatment. Livestock use at the 86 proposed water developments would destroy approximately 44 acres of vegetation and result in sediment losses of 1.0 to 1.5 acre-feet per year, which would be somewhat offset by a reduction in sediment losses around existing waters. Land treatment would cause a loss of about 47 acre-feet per year for 2 or 3 years. After ground cover is stabilized, however, sediment loss would decline.

ANIMALS

Unfenced spring and riparian habitats accessible to livestock would continue to be in unsatisfactory condition. In addition, wet meadow habitats of overdeveloped springs would be reduced in size or eliminated.

During the construction of water developments, wildlife species would be temporarily disrupted. Water developments would permanently disturb 26 acres of habitat. Livestock grazing around 86 new water developments would

TABLE 3-19
MITIGATING MEASURES

Adverse Impact	Mitigation	Result of Mitigation
	VEGETATION	
Unidentified potential impacts on proposed threatened and endangered species.	BLM will continue to study and inventory proposed threatened and endangered plant species. Grazing systems and range improvements will be adjusted according to needs of subject species.	Managers will gain a better understanding of these species and will be better able to protect them.
Unidentified potential impacts on vegetation.	An undetermined number of exclosures (20 to 100 acres each) will be constructed on range sites of selected allotments.	Exclosures will aid in determining whether grazing systems are meeting objectives and assumptions of AMPs. Large enclosures will provide (1) relict areas for comparison purposes in which native vegetation can develop in the absence of livestock grazing and (2) areas to provide information on vegetation production and trend.
	ANIMALS	
Competition between livestock and game and nongame species for food and cover.	Establish 21 100-acre control areas (exclosures) to monitor the effects of grazing systems on wildlife. Analyze specific AMPs and compare the data to control exclosures to assess impacts (MFP Recommendation W-9.1).	Provide area managers with data to partially mitigate the effects of grazing on wildlife populations and reduce the competition through AMP adjustments.
Livestock-bighorn sheep forage competition would prevent the expansion of bighorns into their potential habitat.	In existing bighorn habitat, determine the distribution and extent of bighorn use. Identify areas of conflict and fence them to exclude livestock. In potential bighorn habitat potential conflicts between livestock and bighorn will be determined. Data collected from enclosure studies will be used to predict conflicts before sheep are released. Potential areas of conflict will then be fenced to exclude wildlife.	Livestock-bighorn competition will be eliminated, and the bighorn herd may expand.
Land treatment would reduce the diversity of nongame populations on 124,610 acres of habitat.	The impact of treated pinyon-juniper woodland, sagebrush, and blackbrush on nongame wildlife will be investigated to determine the diversity and density of nongame bird and small mammal populations on treated and untreated (control) habitats. Design changes will be incorporated into habitat modification projects to help reduce impacts. Whenever feasible, habitat proposed for treatment will be burned instead of chained. Prescribed burning will help reduce the projected decrease in nongame wildlife diversity.	Mitigation will deter decline of nongame species diversity.
Sacrifice areas around water developments would create unsatisfactory conditions around water developments.	The effects of livestock overgrazing on food and cover surrounding various water developments will be analyzed. The size of affected areas and the conflicts with sedentary and mobile wildlife species will be determined. Management guidelines will then be developed and adopted to reduce size of sacrifice areas around waters.	Habitat conditions around waters will improve.
Lack of adequate information on the dietary overlap between livestock and big-game species would prevent management from resolving livestock-wildlife competition problems.	Key forage species for livestock and big game will be determined through fecal analyses on various ranges in the ES area. The current allocation of key forage species will be evaluated by season and area, and conflicts in the diet of livestock and wildlife will be determined. Range managers will then adopt practices based on these determinations.	Conflicts between livestock and big game will be reduced.
	LIVESTOCK GRAZING	
Proposed action would increase workloads and expenses for construction and maintenance of range improvements.	BLM will pay for increased percentages of total costs for construction projects and will be responsible for partial maintenance of some projects.	Increased workloads and expenses will be reduced proportionately to the amount that BLM's contributions increase.
	RECREATION	
Water developments in the Paiute Primitive Area would denude large areas of vegetation and destroy aesthetic and primitive values that the area was created to preserve.	The two water developments proposed for the Littlefield Community allotment will be located in an area of the allotment outside the primitive area.	The objective of the proposed action will be achieved while minimizing adverse impacts to the primitive area.
Water developments and land treatment proposed for the Virgin River Gorge scenic withdrawal and Paiute Primitive Area would jeopardize scenic values of the gorge and primitive area.	The water developments proposed for the Littlefield Community allotment will be located outside the primitive area boundaries and design restrictions imposed to minimize visual intrusion for a visitor to the area. The water developments and land treatment proposed for the Virgin River Gorge will be located out of sight of heavily traveled Interstate Route 15.	The objectives of the proposed action will be achieved while minimizing the adverse impacts to the designated areas.

maintain approximately 10,750 acres of habitat in unsatisfactory condition (see table 3-7).

The construction of 137 miles of new fence in the EIS area would restrict big-game movement, increasing their potential (particularly mule deer) to become entangled in fences and to perish.

Land treatment on 128,510 acres of habitat would decrease the diversity of nongame populations. Climax wildlife species would be permanently removed from treated areas, but they could potentially return if treated areas are allowed to revert to native habitat.

Thirty-three miles of new two-track road would permanently disturb 16 acres of habitat and increase the frequency of disturbance on 10,506 acres (¼ mile travel influence zone) for certain wildlife species. The illegal shooting and collecting of wildlife could also increase.

Variables such as drought (low range productivity), lack of adequate range supervision, and inherent differences in types and locations of grazing systems would affect the extent of adverse impacts and the wildlife species affected. Numerous variables and a lack of current data make difficult evaluating probable impacts to specific wildlife groups.

Two-pasture deferred systems (involving 149,114 acres of habitat) would adversely impact wildlife populations by decreasing vigor and density of important wildlife forage. Although less intensive grazing would average 50 percent utilization, it would provide for no rest to protect key wildlife forage species during their critical growing period. The vigor of browse would decrease on 105,338 acres of habitat.

Livestock would continue to compete with wildlife until grazing systems are implemented. Approximately two-thirds of the total EIS area would remain in current conditions.

The proposal stipulates an average utilization of 50 percent of key forage species. Pastures, however, at times experience utilization above and below 50 percent. Utilization exceeding 60 percent within a specific pasture or allotment in the short term would adversely impact wildlife species inhabiting the area. Wildlife and livestock would compete more heavily. Likewise, failure to move livestock by required rotation dates would decrease the vigor of browse and herbaceous species, which might be reflected in poor growth or seed production the following year. This short-term adverse impact would be realized until the grazing system is back on correct pasture movement dates, which are based on the physiological requirements of key forage species. Drought would amplify the impacts to wildlife of overutilization and incorrect pasture rotation dates.

CULTURAL RESOURCES

Despite mitigating measures, sites not discovered during project surveillance would almost certainly be damaged. In addition, salvage of cultural resources would have unavoidable adverse impacts. Once excavated, a site is effectively destroyed and removed from future research considerations and newly developed techniques.

VISUAL RESOURCES

Vegetation removal, soil disturbance, and placement of range improvement structures on the landscape would adversely impact visual resources. Although BLM policy requires design restrictions and stipulations to minimize intrusions, structures and disturbances would represent unavoidable visual impacts. Thus, all adverse impacts identified would be unavoidable.

LIVESTOCK GRAZING

The initial reductions in animal unit months (AUMs) would have the following long- and short-term adverse impacts on livestock operations:

Short-term:	Reduction from grazing preference of 44,434 AUMs or 41 percent.
Long-term:	Reduction from grazing preference of 22,212 AUMs or 20 percent.
Short-term:	Reduction from present 5-year average licenses use of 19,635 AUMs or 23 percent.

The additional time and labor involved in constructing and maintaining range improvements and in moving livestock to implement grazing systems would increase costs to operators.

RECREATION

Intrusions within view of archaeological sites would lower the quality of archaeological sightseeing.

Roads, fences, water sources, land treatments, and other man-caused alterations of the natural environment would unavoidably degrade primitive values.

ECONOMIC AND SOCIAL CONDITIONS

None of the adverse economic and social impacts can be mitigated, and they are thus all unavoidable.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

This section identifies the irreversible and irretrievable commitments of resources resulting from the proposed action. The term "irreversible" refers to what is incapable of being reversed: once something is initiated, it would continue. The term "irretrievable" means irrecoverable: once something is used, it is not replaceable.

Under the proposed action approximately 25 acres would be occupied by new water developments. These areas would lose their capacity to produce vegetation for the life of the development. Except for the actual material destroyed or removed at the time of improvement construction and land treatment, however, none of the impacts on vegetation would be irreversible or irretrievable.

Removing vegetation cover to implement range improvements would cause the irretrievable loss of about 47 acre-feet of soil per year until the soil surface stabilizes in 2 or 3 years.

Proposed livestock grazing and range developments could disturb certain cultural resources, either directly or through vandalism. Once disturbed, historical and archaeological sites and artifacts would be lost to future study. Such losses can create irretrievable data gaps in the history of an area.

The proposed action would involve the commitment of material associated with proposed improvements. Once installed, these materials would be irretrievably committed, although some might be salvaged.

The major irreversible and irretrievable commitment would involve the costs of installation and maintenance of improvements and the administration of the proposal. Once the expenditures are made, these particular funds could not be used for other public programs. In addition, labor associated with the proposal, once expended, could not be retrieved.

RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

This section analyzes the trade-offs between short-term use and long-term productivity of individual resources affected by the proposed action (table 3-20). For this analysis, short term refers to the 8-year period of AMP implementation (1981-1989), and long term refers to the period of time from initiation of AMP implementation to the year 2004, when the environmental impacts of the proposed action on productivity should be apparent.

TABLE 3-20
SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY: TRADE-OFFS

Resource	Short Term	Long Term	Trade-Offs	Net Effect On Resource Over The Long Term
Vegetation	Range improvement construction would disturb 119 acres of vegetation.	After construction of these projects, 121 to 2,345 acres of vegetation would remain in various degrees of disturbance due to new waters servicing previously lightly and ungrazed areas.	Construction of range improvements, especially waters, would aid in implementing rotation grazing systems, helping to better distribute livestock and allowing the vegetation to improve in species composition, density, and trend. The trade-off would be 121 to 2,345 acres disturbed due to new areas serviced by waters. These areas would heal or partially restore during rest periods.	Improvement
	Chaining would destroy 85,768 acres of pinyon-juniper, plowing would destroy 25,100 acres of sagebrush and burning would destroy 17,650 acres of blackbrush.	Burning, chaining, and plowing would increase usable forage by 100 to 400%. Diversity of species composition would increase.	In exchange for 128,010 acres of vegetation disturbance, the land treatment would improve the usable forage component on low production acres and balance carrying capacities to facilitate the effectiveness of the grazing systems. Brush monotypes would be replaced by a diverse community.	Improvement
	On acres grazed during critical periods (spring-early summer) the concentration of livestock would interfere with vigor, health, production of seed, and the establishment of new seedlings. The concentration of livestock would also increase soil disturbance, restricting root growth and the infiltration of water needed for plant growth.	On areas under grazing systems, key grasses, forbs, and browse would increase in species composition, and areas of deterioration would increase in ground cover. The increased cover would increase litter, which would help retain soil moisture, add soil nutrients and increase plant vigor. These improvements would occur as a result of proper use, alternating season of use, and rest from grazing.	The trade-off would result in improved vegetation vigor, trend, and production as a result of rotation grazing systems, reduction in livestock numbers or both.	Improvement
Soils	Grazing systems and range improvements	Sediment yield in the ES area would decline by 66 acre-feet per year.	Short-term soil loss from land treatment and construction would be traded for long-term decrease in sediment yield.	Improvement
Water Resources	86 new water developments	New water developments would lessen livestock concentration around existing waters, decreasing compaction and sediment yield.	Slight increase in sediment yield from compaction around 86 new waters would be traded for greater decrease in sediment yield resulting from decreased livestock concentration.	Improvement
Animals	137 miles of new fence needed to implement grazing systems	Fences would reduce livestock-wildlife competition by allowing increase in forage.	Restriction of big-game movement and death by fence entanglement would be traded for reduced competition and increased wildlife forage.	improvement
	Construction of 86 water developments	Water developments would increase the distribution of big game and upland game and allow the use of food and cover in habitats previously lacking water.	Increased livestock-wildlife competition around new waters would be traded for increased distribution of big game and upland game.	Improvement
	Fencing of water developments	Productivity of waterfowl, shorebirds, small game, and upland game would increase.	No significant trade-offs would be involved.	Improvement
	Fencing of riparian and spring habitats	Condition of habitats and productivity of animals associated with spring and riparian habitats would dramatically increase.	Blocking of big-game access to water and risking their entanglement in fences would be traded for improved habitat and animal production.	Improvement
	Land treatment on 124,510 acres of native habitat	Big-game species would benefit when pinyon-juniper woodland is treated above 6,000 feet (summer range). Improvement in the forb component should increase fawn production and survival.	Localized decreases in diversity of nongame populations would be traded for benefits to big game.	Uncertain
Cultural Resources	Land treatment	Land treatment would unintentionally destroy or damage unlocated surface and subsurface sites.	Permanent depletion of cultural resource data base would outweigh short-term gains in knowledge from project clearance inventory.	Deterioration
	Range improvement maintenance roads	Roads would increase access to sites and thus vandalism to them.	Expenses saved from not applying protection and preservation measures would be traded for vandalism to sites.	Deterioration
Visual Resources	Range improvement projects, roads, and land treatment	Permanent adverse visual contrasts would occur around all water projects and roads where revegetation would not occur. Proposed land treatments, however, would improve scenic quality in the long term.	Greater visual contrast in localized areas, such as reservoirs, would be traded for implementation of grazing systems that would improve the overall appearance of the visual resource.	Improvement
Livestock Grazing	Reductions in livestock numbers	Reductions in livestock numbers would reduce competition among livestock for forage, increasing vegetation and making additional forage available for livestock. Range condition and trend would improve with livestock numbers adjusted to proper carrying capacities. Within 15 years of implementation of the proposed action 86,527 AUMs would be restored to livestock grazing, an increase in 2,587 AUMs over the present 5-year average. In the long term, calf weaning weights, percent calf crops, and cow weights would increase and death losses would decrease.	Initial reductions in ranch incomes and values on some allotments and a short-term decline in cow and calf weights would be traded for the numerous long-term benefits expected.	Improvement
Recreation	Range improvement construction and land treatment	Additional roads would improve access, benefiting ORVs, general sightseeing, and other leisure activities. Habitat improvement should improve big- and small-game hunting.	Loss of primitive values would be traded for improved access, improved vegetation appearance, and improved hunting.	Improvement
Economic and Social Conditions	The proposed action would require decreases in allowable livestock use and expenditures for construction and maintenance of range improvements.	In the long term the productivity of livestock operations would improve because of the existence of a reliable forage supply. Quantity and quality of livestock forage would increase. Livestock operation earnings would increase.	The expenditure of dollars and labor and loss of income from livestock would be traded for long-term increases in quantity and quality of livestock forage, resulting in increased ranch income.	Improvement

CHAPTER 4

PREPARERS

TABLE 4-1
LIST OF PREPARERS

Name	EIS Assignment	Position	Education	Experience
Dennis R. Carter	Team Leader	Environmental Specialist	B.S. Botany and Range Management, Brigham Young University	8 years BLM
William K. Carter	ES Coordinator	Environmental Coordinator	B.S. Agronomy, Kansas State University	13 years BLM
Herbert K. McCinty	Editor and Technical Coordinator	Writer-Editor	B.A. History, Duke University M.A. Geography, Clark University; Certificate of Accomplishment in Editorial Practices, U.S. Department of Agriculture Graduate School	3 years BLM, 3 1/2 years U.S. Geological Survey
George W. Ramey	Arizona State Office Coordinator	Range Specialist	B.S. General Forestry and Range Management, Utah State University	15 years BLM
Lee E. Hughes	Vegetation	Vegetation Specialist	A.S. Forestry, North Dakota State University; B.S. Range and Fishery Management, Utah State University	7 years BLM
Neal R. Middlebrook	Wildlife and Climate	Wildlife Biologist	B.S. Wildlife Management, Humboldt State University	5 years BLM, 1 year California Fish and Game Department
Roger P. Blair	Recreation, Wilderness Visual Resources, and Public Affairs	Outdoor Recreation Planner	B.S. Forest Production, University of Illinois; M.S. Forest Recreation, University of Missouri	2 years BLM, 1 1/2 years Bureau of Reclamation, 2 years Washington County, Oregon Parks and Recreaton; 3 years Bureau of Outdoor Recreation
Vear L. Mortensen	Soils, Water Resources, Geology, and Topography	Soil Scientist	B.S. Soil Science, Utah State State University; Post Graduate Work, Iowa State University	2 years BLM, 23 years Soil Conservation Service
Richard D. Malcomson	Cultural Resources	Archaeologist	B.A. University Studies, (Anthropology and Archaeology), M.A. Anthropology and Education, University of New Mexico	2 1/2 years BLM, 1 year New Mexico State University Division of Cultural Resources Management
C. Dwayne Sykes	Land Use, Livestock Grazing and Wild Burros	Range Specialist	B.S. Agriculture, New Mexico State University	3 1/2 years BLM
Jeanette Pranzo	Socioeconomics	Regional Economist	B.A. Economics, minor Sociology, Hunter College; M.A. Economics, University of Pittsburgh; 1 year's study in Natural Resource Economics, Colorado State University	3 years BLM, 5 years Corps of Engineers

CHAPTER 5

CONSULTATION AND COORDINATION

CHAPTER 5

CONSULTATION AND COORDINATION

CONSULTATION AND COORDINATION IN PREPARATION OF THE DRAFT EIS

During preparation of the draft EIS, BLM sought information from State and Federal agencies and universities with expertise relating to the proposed action. Records of correspondence are on file in the Arizona Strip District office.

The Arizona Strip District issued news releases describing the EIS and requesting the contribution of interested individuals and groups. As a follow-up to the news releases, the District wrote letters to a broad spectrum of resource users, groups, individuals, and agencies. These letters described the Shivwits EIS and requested information, opinions, and suggestions on its preparation.

The Arizona Strip District prepared a briefing on the actions proposed in the EIS and presented it to congressional delegations, county commissions, livestock associations, and other interested groups and individuals.

The District also held an open house to receive comment on the Grand Wash Management Framework Plan, the source of the proposed action's provisions.

COORDINATION IN THE REVIEW OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

BLM will request comments on the draft EIS from the following agencies and interest groups:

Advisory Council on Historic Preservation

Department of Agriculture

- Agricultural Stabilization and Conservation Service
- Forest Service
- Soil Conservation Service

Department of the Interior

- Bureau of Indian Affairs
- Bureau of Mines
- Bureau of Reclamation
- Heritage Conservation and Recreation Services
- National Park Service
- U.S. Fish and Wildlife Service
- U.S. Geological Survey

Environmental Protection Agency

Arizona, Nevada, and Utah Congressional Delegations

State Agencies

Arizona

- Arizona Agriculture and Horticulture Commission
- Arizona Association of Conservation Districts
- Arizona Department of Library and Archives
- Arizona Department of Transportation
- Arizona Game and Fish Department
- Arizona Indian Affairs Commission
- Arizona Natural Resource Conservation Districts
- Arizona Office of Arid Land Studies
- Arizona Office of Economic Planning and Development
- Arizona Outdoor Recreation Coordinating Commission
- Arizona State Clearinghouse
- Arizona State Historic Preservation Officer
- Arizona State Land Commissioner
- Arizona State Parks Board
- Commission on Arizona Environment
- Director, League of Arizona Cities and Towns
- State Department of Property Evaluation

Nevada

- Governor's Office
- Nevada Department of Conservation and Natural Resources
- Nevada Department of Economic Development
- Nevada Fish and Game Department
- Nevada State Clearinghouse
- Nevada State Historic Preservation Officer

Utah

- Commissioner, Utah Department of Agriculture
- Utah Division of Lands
- Utah Division of Natural Resources
- Utah Division of Wildlife Resources
- Utah Environment Center
- Utah Office of State Planning
- Utah State Clearinghouse
- Utah State Engineer
- Utah State Historic Preservation Officer

Local Government

Clark County Commissioners
Clark County Cooperative Extension Service
Clark County Planning Commission
Clark County Planning Department
District IV Council of Governments
Fredonia Town Council
Hurricane Town Council
Iron County Extension Service
Littlefield Town Council
Mayor of St. George
Mohave County Board of Supervisors
Mohave County Extension Service
Mohave County Manager
Mohave County Planning and Zoning Commission
Northern Arizona Council of Governments
Washington County Commission
Washington County Extension Service

Other Organizations

American Fisheries Society
Amerind Foundation
Arizona Archaeological Society
Arizona Association of Earth Science Clubs
Arizona Camping Association
Arizona Cattle Growers Association
Arizona Conservation Council
Arizona Desert Bighorn Sheep Society
Arizona Farm Bureau Federation
Arizona Roadside Council
Arizona Wilderness Study Committee
Arizona Wildlife Federation
Arizona Wildlife Society
Arizona Wool Growers Association
Defenders of Wildlife
Desert Research Institute
Friends of the Earth
Isaak Walton League of America
Hurricane Chamber of Commerce
Littlefield-Hurricane Valley Conservation District
Mohave County Cattle Growers Association
Mohave County Farm Bureau
Mohave Sportsman Club
National 4-Wheel Drive Association
National Council of Public Land Users
Natural Resources Defense Council
Nature Conservancy
Sierra Club
Society for Range Management
Utah Cattlemen's Association
Utah Wool Growers Association
Washington County Cattlemen's Association
Washington County Farm Bureau
Wilderness Society
Wildlife Federation

Interested Individuals

Copies of this draft EIS will be available for public inspection at the locations listed below:

Bureau of Land Management Offices

Washington Office of Public Affairs
18th and C Streets, N. W.
Washington, D.C. 20240
Phone: (202) 343-4151

Arizona State Office
2400 Valley Bank Center
Phoenix, AZ 85073
Phone: (602) 261-3873

Arizona Strip District Office
196 E. Tabernacle
St. George, UT 84770
Phone: (801) 673-3545

A public hearing will be held in St. George, Utah. Details on the hearing will be published in the Federal Register and in local newspapers.

APPENDIXES

APPENDIX 1-1

METHODOLOGY FOR DETERMINING USABLE FORAGE FOR GRAZING ANIMALS

This appendix summarizes methods and procedures used in determining allowable grazing capacity in the Shivwits EIS area. It first discusses the method used to determine stocking rates and then the procedure for allocating wildlife forage and the method for determining potential increases in usable forage.

DETERMINATION OF USABLE FORAGE PRODUCTION

The Arizona Strip District completed a vegetation inventory of the Shivwits Resource Area in 1977, using the forage production method of survey. Before, and in conjunction with this inventory, Phase I Watershed Studies were completed. The Shivwits Resource Area Unit Resource Analysis (URA) was completed in 1973. It provided a data base for use in determining forage production and allocation. Much of the Shivwits EIS area was surveyed for forage production in conjunction with the Phase I Watershed Studies completed in 1975. Before the writing of allotment management plans (AMPs) the remainder of the area was surveyed or rechecked on an allotment-by-allotment basis, involving vegetation data gathering and analysis and determination of forage production and allocation.

BLM resource managers used URA maps of vegetation and soil types and aerial photos to help determine vegetation subtypes. They used on-the-ground surveys and aerial photographs to further refine the vegetation typing. They distinguished the following vegetation subtypes: short grassland, riparian, wet meadow, sagebrush, saltbush, half-shrub, desert shrub, mountain shrub, pinyon-juniper, ponderosa pine, annual, steep and rocky, barren, and inaccessible.

Resource managers assessed usable forage production in the various subtypes by the forage production inventory method (Jensen, 1977), which determines the amount of forage produced by the amount of moisture an area receives.

The Arizona Strip District employed this method only after several years of trial and study by the District and others, who found a good correlation between herbage yield and annual precipitation. The major study drawn upon was conducted by Hutchings and Stewart (1953) at the Desert Experimental Station in western Utah, about 80 to 100 miles north of the Arizona Strip District. In another study, Sharp (1970) found results similar to those of Hutchings and Stewart and to Arizona Strip clipping studies.

This method employs the idea that in the arid to semiarid Southwest, any given area will produce an average of 45 pounds of air dry plant material per acre, per inch of rainfall received, provided no production limitations or special conditions exist. Such conditions or exceptions might include high alkalinity, salt flats, Moenkopie badlands, high rock content, extremely sandy soils, subirrigated land, or saline meadows.

The method provides for the above conditions by the use of production adjustment figures subtracted from the average production of 45 pounds per acre per inch of moisture. For subirrigated areas, values are added onto the average production figure.

The 45 pounds per acre figure was derived through extensive studies and research of similar studies. A study area was selected in extreme southwestern Utah and used for 6 years, 1964-1970. Precipitation data were recorded on the site and clipping studies conducted at peak production time each year to determine the correlation between production and amount of rainfall. Several other sites in southern Utah were clipped as well as sites on the Arizona Strip to help determine the rainfall-production correlation as well as the effects of special soil conditions on production.

Range specialists determined vegetation species composition in the following manner. They determined the vegetation subtype boundary by investigating the area and using aerial photographs. They then made ocular estimates of relative species composition by selecting a sample area that seemed to determine the relative species composition. If the type were large or varied, several such sample areas might have been surveyed and the results averaged.

To further aid in species composition estimates, the specialists might have run one or more pace transects, consisting of 100 points. In such transects each point represents 1 percent of the total (100 points = 100 percent). Upon determining the percent composition, the specialists recorded the data on the vegetation writeup sheet under the following headings:

Key:	Most important livestock and wildlife forage species — increase under good range management. In some cases they are not the most important species to wildlife.
Undesirable:	Plants with little or no forage or watershed value — decrease under good range management.
Intermediate:	Plants mediocre in forage value — may increase or decrease under good range management.

This procedure was completed for each vegetation subtype within each of the allotments in the EIS area. Data gathered in this process included vegetation by species, usable forage vegetation by species, special production limitations (i.e., rocky areas, frail land, alkaline or salty soils, and erosion condition), site variability, apparent condition and trend, utilization of major perennial vegetation species, class of livestock, evident wildlife species and use, distribution, dry areas, improvement possibilities, poisonous plants, and elevation. Phase I Watershed Studies were consulted to gather additional information on litter, bare ground, large and small rock, erosion rates, exposure, effective root depth, and soil type and texture at effective root depth (below 4 inches).

Resource specialists determined range suitability through utilization deductions or a percent yield adjustment of available forage. They adjusted for steep slopes, erosion, hazards, rocky surfaces, and high percentages of bare ground. Areas with conditions extremely unsuitable for livestock grazing were so identified and given no production credit. For the remaining areas, specialists used professional judgment (based on the proper use of the areas and knowledge of livestock grazing) and the following general guidelines in applying utilization deductions.

A. Slope (Degrees)	**% Adjustment**
6	0
6-15	0-10
16-25	10-25
26-35	26-50
36-45	51-80
46	81-100

B. Rocks	**% Adjustment**
10%	0
11-25%	0-5
26-50%	5-20
50-75%	20-50
75-100%	50-100

C. Erosion	**% Adjustment**
Stable and slight	0
Moderate	0-25
Critical	30-55
Severe	60-100

Rather than designating these areas as unsuitable for grazing, specialists made percentage utilization deductions, deducting these percentages from the normal total production of the area. These deductions allow grazing at a lower intensity, except on the 43,521 extremely unsuitable acres previously mentioned.

The amount of rainfall received by each given area was determined from data compiled on each of the 17 rain gauges within the EIS area, plus information obtained from five weather stations in communities within the EIS area. Where data were not available on or near the allotment, isohyetal lines from maps prepared by the U.S. Weather Service were used to determine rainfall received in a particular area.

The percent composition of the vegetation recorded under the headings *Key, Undesirable,* and *Intermediate* was calculated by grouping vegetation in 5 percent increments as to growth form, forage value, and physiological requirements. Total composition equaled 100 percent.

Proper Use Factors (PUFs) were then assigned to the different categories. A PUF represents that portion of a plant or group of plants' annual production, by weight, in relation to another plant or group of productivity. Certain forage species or groups of species are preferred above others and vary from 0 to 50 according to preference of grazing animals, plant availability, and season of use.

The plant species grouped as key species are usually assigned a total PUF of 50 percent since these are the most preferred plants. Those plants considered undesirable are generally

AS-01-4412-22
2/7/72

Aerial Photo No. Date

VEGETATIVE ANALYSIS

Examiner Write up No. Type Key Area Location

Species	Composition		Potential		Condition		P.U.F		% Proper Use		Potential P.U.	
	Type	Key A.	Type	KeyA	Type	KeyA	Lvstk	Wldlf	Lvstk	Wldlf	Lvstk	Wldlf
Key	25		45									
Sihy-Orhy Agsm-Stco	5		15				.15	.05	.0225	.0025	.0675	.0075
Bogr-Hija	15		20				.45	.05	.9675	.0075	.0900	.0100
Cqst-Quga	5		10				.25	.25	.0125	.0125	.0250	.0250
Undesirable	35		25									
P-J	20		20									
Gusa	15		5									
Opum	T											
Other	40		30									
Artr	25		20				.05	.10	.0125	.0250	.0100	.0200
Penst	5		5				.05	.10	.0025	.0050	.0025	.0050
Chryso	10		5				.05	.05	.0050	.0050	.0025	.0025
TOTAL	100%	100%	100%	100%					.1225 12%	.0575 6%	.1975 20%	.0700 7%

Precipitation 11"	Utilization Deduction Total 10% Slope(Livestock) Frail Lands Low Production Rocks..........10% Rodents	Wildlife Species & Use: Male Deer, Moderate
Production 495	Erosion Class 1- 2- 3-(0-15%) 4-(20-55%) 5-(60-100%)	
Unserviced Areas: Photo No. Acres:___ AUM's:___	Treatment Areas: Photo No. Acres:___ AUM's___	Usable Plant Production: Livestock: 446 ___ Wildlife: 446 ___

	ESTIMATED FORAGE PRODUCTION						
	Livestock		Wildlife		Total		
	Present	Potential	Present	Potential	Present	Potential	
lbs./Air dry	54	89	27	31			Average
	41	67	20	23			75% of Average
A./AUM	14.8	9.0	29.6	25.8			Average
	19.5	11.9	40.0	34.8			Stocking Rate
AUM's 1600.00	82	134	40	46			

given no use, and those considered intermediate assigned PUFs ranging from 5 to 30 percent. The percent composition is multiplied by the PUF to get the percent proper use. Percent proper use of key species is added to the percent proper use of the intermediate species to get the total percent proper use. The next step is to determine the total plant production in pounds per acre per year of the specific area by multiplying 45 pounds per acre by average annual rainfall, less any production adjustments.

Having arrived at a production figure, the specialists determined the usable forage production by multiplying the total percent proper use by the total or adjusted plant production. The resulting figure is the amount of air dry forage produced per acre per year, which grazing animals may use in an average year. Because this figure represents average production and as many years are below average as are above, the average annual forage production was reduced by 25 percent to allow for the below average years. The stocking rate is thus 75 percent of average production.

This adjustment allows for the below average years as well as the drought years that occur periodically. Little livestock adjustment is thus needed, even in unusual years. This 75 percent of average stocking rate was borne out by clipping studies conducted during the formulation of this forage production method and also by other research studies that were evaluated during the formulation of the method. (See description of forage production method on file in the Arizona District office.)

This 75 percent of annual forage production figure is then divided into 800 pounds, the amount of air dry forage needed to sustain one cow and one calf or equivalent for one month. The resulting quotient is expressed in acres per AUM. Acres per AUM divided into the total acres in the type yields total AUMs for the type. (See attached vegetation analysis for computations.)

The following computations were made for each vegetation type in each allotment.

1. PUF × Percent Composition = Percent Proper Use. (This step was performed for key species and intermediate species.)

2. Percent Proper Use of Key Species + Percent Proper Use Intermediate = Total Percent Proper Use.

3. Precipitation × 45 lbs. + Any Production Adjustments = Total Production.

4. Total Production × Total Percent Proper Use = Estimated Forage Production.

5. .75 × Estimated Forage Production = Stocking Rate.

6. 800 lbs. divided by Stocking Rate = Acres/AUM.

7. Total Acres of Type divided by Acres/AUM = Total AUMs Per Type.

8. The number of AUMs produced in each type in the allotment were then totaled to get the total AUMs for the allotment.

The vegetative analysis form illustrates the calculation of usable forage production using the following procedure:

The second listing under the species column lumps Sihy, Orhy, Agsm, and Stco as constituting 5 percent of species composition. This 5 percent or .05 is then multiplied by the PUF of .15 for livestock and .05 for wildlife, resulting in a product of .0225 for livestock and .0025 for wildlife. Similar calculations are made for all species in the species column. For each calculation, applicable PUFs are used.

The percent proper use figures for all species with PUFs are added, totaling .1225 or 12 percent for livestock and .0575 or 6 percent for wildlife.

These sums are then multiplied by 495 pounds/acre — the total vegetation production under 11 inches of annual precipitation: 12% × 495 lbs. = 59.4 = total pounds of usable production.

From this product, however, a utilization deduction of 10 percent is made to allow for rocks that prevent plant growth. Usable forage production for livestock would thus amount to 54 pounds/acre. Calculation of usable forage production for wildlife would be as follows: 6% × 495 = 29.7; 29.7 × .9 = 27 lbs./acre.

These 54 and 27 pounds are then listed on the vegetative analysis form in the "present" box under estimated forage production.

The 41 and 20 pounds are converted to AUMs by dividing them into 800 pounds, the amount of forage required to feed one animal unit for one month. The resulting quotients constitute the present carrying capacity — 19.5 acres/AUM for livestock and 40 acres/AUM for wildlife. The values 14.8 and 29.6 (appearing immediately above 19.5 and 40 on the vegetative analysis form) represent acres/AUM without a 25 percent drought buffer reduction.

Finally, the 19.5 acres/AUM and 40 acres/AUM are divided into the 1,600 acres of subtype represented by this vegetative analysis form. The quotients represent usable forage AUMs in the subtype: 82 AUMs for livestock and 40 AUMs for wildlife.

DETERMINATION OF FORAGE ALLOCATION FOR WILDLIFE AND LIVESTOCK

Wildlife forage requirements were determined from habitat management plans in the resource area, MFP decisions, and recommendations from the Arizona Game and Fish Department (AG&FD). BLM and AG&FD cooperatively formulated a wildlife forage allocation to satisfy the needs of a "reasonable number" of big-game animals. This number was of high and low populations that occurred in the past. Big-game populations are presently lower than the "reasonable number" agreed upon. The acres of various habitats contained in each allotment were inventoried in conjunction with AMP development, and a determination made as to the number of wildlife AUMs needed. (See Grand Wash MFP.)

The AUMs needed for wildlife were determined simultaneously with the livestock AUMs by incorporating dual-use factors for wildlife and livestock within the proper use limits outlined in the previous section (Determination of Usable Forage Production). Dual-use means dividing the total allowable PUFs between livestock and wildlife.

For cattle and mule deer a total PUF on cliffrose would amount to 50 percent. In the allocation of use on this species, 25 percent would go to mule deer and 25 percent to cattle. See attached vegetation analysis sheet.

Allocations were made on key species as well as intermediate species, depending on wildlife species and use. (See sample vegetation writeup sheet attached.)

The one exception was antelope for which an allocation was determined and subtracted directly from livestock carrying capacity.

PROJECTION OF FORAGE PRODUCTION INCREASES

Potential forage production was determined on the basis of production within 15 years under proposed management. Future usable production or the total estimated increase in AUMs over a 15-year period was projected by the following method.

Future usable production by acre of grassland, sagebrush, pinyon-juniper, saltbush, and desert shrub was determined from the existing field estimates of those subtypes under good, fair, and poor condition. These estimates were then averaged by the above types. The average percent increase in usable forage production was determined for each of the above subtypes between the three condition ratings. That percent then was applied on an allotment and subtype basis to those acres subject to a condition change over a 15-year period by the proposed action.

The creosotebush, half-shrub, and annual vegetation subtypes had enough data to predict production under fair and poor condition but not enough data to predict production under good range condition.

The shadscale subtype was so rare that its production was not predicted. The conifer subtype would remain unchanged because of the ecology of the subtype. Since the blackbrush type is similar in many respects to the desert shrub type, prediction figures for blackbrush were borrowed from the desert shrub subtype in the few areas where the blackbrush had the potential for change.

DETERMINATION OF RANGE CONDITION, TREND, AND UTILIZATION

RANGE CONDITION METHODOLOGY

Good Condition: Composition is 40 percent or more of both desirable (key species and the most palatable, nutritious plant species for livestock and wildlife) and intermediate species (a less desirable species in palatability to livestock and wildlife). The soil surface factor (SSF) is less than 40.

Fair Condition: Composition is 16 to 39 percent of desirable and intermediate species. The SSF is less than 60.

Poor Condition: Composition is less than 15 percent. SSF is more than 60.

Desirable plants are palatable and productive forage species often dominant under or near climax conditions. They are long lived and have deep fibrous roots to protect watershed against erosion. Desirable plants include the key species.

APPENDIX 2-2
DETERMINATION OF PRESENT AND FUTURE SEDIMENT YIELD

Data to determine sediment yields were taken from the BLM Phase I Watershed Conservation and Development Inventory (WC&DI) conducted from 1971 to 1973.

Resource specialists delineated areas on base maps, using much the same criteria as the ocular reconnaissance range survey but considering additional factors such as critical soil erosion and slope changes. They then used a step-point or pace transect of 100 points, taking a reading at each point, which represented one percent. They collected the following data at each location: type of ground cover (litter, bare ground, large or small rock), vegetation composition by species, effective root depth, and percent slope (Form 7330-12). They then used these data to predict the present and future sediment yield by a method developed by the BLM Denver Service Center from the Pacific Southwest Inter-Agency Committee method.

Phase I WC&DI data for surface geology, soil texture, climate, runoff, topography (slope), ground cover, upland erosion, and channel erosion were used with nomographs produced by the Denver Service Center to approximate data needed for the PSIAC method.

As an example the following table shows how the WC&DI information was converted using the nomographs to PSIAC factor values to determine sediment yields on the Black Rock allotment.

Channel Erosion	WC&DI VALUES (Average of 8 Transects on Black Rock Allotment)		ADAPTED PSIAC FACTOR VALUE (From Nomographs)	
	Present	Future	Present	Future
Geology	3	3	5	5
Soils	4	4	7	7
Climate	1.2	1.2	8	8
Runoff	13	13	8	8
Topography	13	13	8	8
Ground Cover	10	10	-8	-8
Land Use	12	9	-7	-8
Upland Erosion	42	40	13	12
Channel Erosion	4	4	7	7
Total			41	39

Resource specialists applied the totals to the PSIAC conversion table and obtained a value for sediment yield (acre feet/square mile) of 0.35 (present) and 0.33 (future). They then multiplied these figures by the square miles in the allotment to get total sediment yield.

APPENDIX 2-3
KEY PLANT SPECIES FOR BIG GAME

MULE DEER

Grasses	Forbs	Browse
Introduced wheat grasses	Mountain dandelion	Birchleaf mountain mahogany
Squirreltail	Penstemon	Gambel oak
Western wheatgrass	Deer vetch (*Lotus* spp.)	Turbinella oak
Mountain brome	*Menodora* spp.	Cliffrose
Mutton grass	Yellow sweet clover	*Ceanothus* spp.
	Mallow spp.	Serviceberry
		Bitterbrush
		Eriogonum spp.
		Fourwing saltbush
		Mormon tea

PRONGHORN ANTELOPE

Grasses	Forbs	Browse
Galleta	Globemallow	Paper flower
Blue grama	Fiddle-neck	Big sagebrush
	Buckwheat	Winterfat
	Penstemon	Bigelow sage
	Desert marigold	Shrubby buckwheat
	Milkweed	Rabbitbrush
	Crownbeard	Shadscale
		Mormon tea
		Snakeweed

BIGHORN SHEEP

Grasses	Forbs	Browse
Stipa spp.	Globemallow	Mormon tea
Squirreltail	Indian-wheat	Big sagebrush
Mutton grass	Four-o'clock	Mountain mahogany
Galleta	Opuntia	Brittlebrush
Fluffgrass	Filaree	Range ratany
Bush muhly	Silk tassel	Winterfat
Three-awn		
Indian ricegrass		

APPENDIX 3-1
PRESENT AND PROJECTED RANGE CONDITION: PROPOSED ACTION AND ALTERNATIVE 3

		Current Range Condition (Acres)			Apparent Range Trend			Total	Proposed Action and Alternative 3 Range Condition		
Allotment	Vegetation Type	Good	Fair	Poor	Up	Static	Down	Acres	Good	Fair	Poor
Beaver Dam Slope	Desert Shrub			13,719	9,314	4,405		13,719			13,719
(actual trend)	Creosotebush			21,251		21,251		21,251			21,251
	Unsuitable			1,118		1,118		1,118			1,118
	Total			36,088	9,314	26,774		36,088			36,088
Belnap West	Grassland		1,165			1,165		1,165	1,165		
	Sagebrush/Grassland		2,231			2,231		2,231	2,231		
	Unsuitable			1,070		1,070		1,070			1,070
	Total		3,376	1,070		4,466		4,466	3,376		1,070
Belnap East	Grassland	6,744				6,744		6,744	6,744		
	Sagebrush		2,966			2,966		2,966	2,966		
	(treatment)								(2,120)		
	Total	6,744	2,966			9,710		9,710	9,710		
									(+2,120)		
Black Rock	Grassland	443					443	443	443		
(actual trend)	Sagebrush		741			741		741		741	
	Mountain shrub		3,789		3,789			3,789	3,789		
	Conifer			1,391		1,391		1,391			1,391
	Pinyon-juniper		17,578			17,578		17,578		17,578	
	(treatment)								(2,400)		
	Creosotebush	8,671				8,671		8,671	8,671		
	Desert shrub		3,702			3,702		3,702		3,702	
	(treatment)								(2,840)		
	Total	9,114	25,810	1,391	3,789	32,083	443	36,315	12,903	22,021	1,391
									(+5,240)	(-5,240)	
Blake Pond	Desert Shrub		3,269			3,269		3,269	5,499		
	Mixed desert shrub			2,230		2,230		2,230			
	Sagebrush		2,660			2,660		2,660	2,660		
	(treatment)								(1,000)		
	Snakeweed		3,827			3,827		3,827	3,827		
	Juniper		3,143			3,143		3,143		3,143	
	Creosotebush		2,939	1,120		4,059		4,059		2,939	1,120
	Shadscale			1,535		1,535		1,535			1,535
	Total		15,838	4,885		20,723		20,723	11,986	6,082	2,655
									(+1,000)		
Cedar Wash	Desert shrub		9,368			9,368		9,368	9,368		
	Unsuitable			4,547		4,547		4,547			4,547
	Total		9,368	4,457		13,915		13,915	9,368		4,547
Clay Spring	Grassland	4,414			4,414			4,414	4,414		
(actual trend)	Pinyon-juniper			2,197		2,197		2,197			2,197
	Desert shrub			4,962			4,962	4,962			4,962
	Annuals	430					430	430	430		
	Total	4,844		7,159	4,414	2,197	5,392	12,003	4,844		7,159
Cottonwood	Pinyon-juniper			7,297		7,297		7,297			7,297
	(treatment)								(+1,480)		
	Desert shrub			1,481		1,481		1,481			1,481
	Grassland			471		471		471		471	
	Annual grass			20,933		20,933		20,933		20,933	
	Sagebrush			377		377		377			377
	Snakeweed		2,000	596		2,596		2,596		2,000	596
	Total		2,000	31,155		33,155		33,155		23,404	9,751
									(+1,480)		(-1,480)
Diamond Butte	Grassland	1,761	1,450			3,211		3,211	3,211		
North	Unsuitable			165		165		165			165
	Total	1,761	1,450	165		3,376		3,376	3,211		165
Diamond Butte	Grassland	1,915				1,915		1,915	1,915		
South	Saltbush	165				165		165	165		
	Total	2,080				2,080		2,080	2,080		
Rosenberry	Grassland	3,795				3,795		3,795	3,795		
	Unsuitable			180		180		180			180
	Total	3,795		180		3,975		3,975	3,795		180
Iverson	Grassland	2,403				2,403		2,403	2,403		
Dripping Spring	Desert shrub			12,954		12,954		12,954			12,954
	Unsuitable			4,450		4,450		4,450			4,450
	Total			17,404		17,404		17,404			17,404
Duncan Tank	Grassland	3,624				3,624		3,624	3,624		
	Unsuitable			4,625		4,625		4,625			4,625
	Pinyon-juniper	736				736		736	736		
	Desert shrub	1,366				1,366		1,366	1,366		
	Total	5,726		4,625		10,351		10,351	5,726		4,625
Grassie Mountain	Pinyon-juniper		63,174			63,174		63,174		63,174	
	(treatment)								(19,550)		
	Sagebrush		35,817			35,817		35,817		35,817	
	(treatment)								(7,680)		
	Desert shrub			12,673		12,673		12,673			12,673
	Unsuitable			1,598		1,598		1,598			1,598
	Total		98,991	14,271		113,262		113,262		98,991	14,271
									(+27,230)	(-27,230)	

APPENDIX 3-1 (continued)

Allotment	Vegetation Type	Current Range Condition (Acres) Good	Fair	Poor	Apparent Range Trend Up	Static	Down	Total Acres	Proposed Action and Alternative 3 Range Condition Good	Fair	Poor
Mesquite Community	Desert shrub			30,627		30,627		30,627			30,627
	Snakeweed			4,391		4,391		4,391			4,391
	Mountain shrub			8,551		8,551		8,551			8,551
	Pinyon-juniper		348	3,137		3,485		3,485		348	3,137
	Annual grass			5,214		5,214		5,214		5,214	
	Unsuitable			1,392		1,392		1,392			1,392
	Total		348	53,312		53,660		53,660		5,562	48,098
Mormon Well	Desert shrub	2,016		10,158		12,174		12,174	2,016		10,158
	Creosotebush			2,470		2,470		2,470			2,470
	Unsuitable			745		745		745			745
	Total	2,016		13,373		15,389		15,389	2,016		13,373
Mt. Trumbull (actual trend)	Grassland	8,259				8,259		8,259	8,259		
	Sagebrush		2,185			2,185		2,185	2,185		
	Pinyon-juniper		5,211			5,211		5,211		5,211	
	Desert shrub		14,552			14,552		14,552	--	No data	--
	Annuals			220		220		220		220	
	Creosotebush			40		40		40	--	No data	--
	Unsuitable			2,432		2,432		2,432			2,432
	Total	8,259	21,948	2,692		32,899		32,899	10,444	5,431	2,432
Mosby	Desert shrub			862		862		862			862
	Blackbrush			802		802		802			802
	Total			1,664		1,664		1,664			1,664
Mosby-Nay	Annuals			5,826		5,826		5,826		5,826	
	Creosotebush		513	860		1,373		1,373		513	860
	Blackbrush			6,551		6,551		6,551			6,551
	Desert shrub		1,058	5,807		6,865		6,865		1,058	5,807
	Mountain shrub		1,770			1,770		1,770		1,770	
	Half shrub		480	1,743		2,223		2,223		480	1,743
	Total		3,821	20,787		24,608		24,608		3,821	20,787
Unallotted	Desert shrub		815	5,216		6,031		6,031		815	5,216
	Half shrub		270			270		270		270	
	Total		1,085	5,216		6,301		6,301		1,085	5,216
Mud and Cane Spring	Mountain shrub			2,701		2,701		2,701			2,701
	Sagebrush		233			233		233		233	
	Pinyon-juniper		509	42,268		42,777		42,777		509	42,268
	(treatment)								(4,160)		
	Blackbrush			12,934		12,934		12,934			12,934
	(treatment)								(5,760)		(-5,760)
	Grassland	223				223		223	223		
	Annuals	2,902	20,902			23,804		23,804	23,804		
	Unsuitable			158		158		158			158
	Total	3,125	21,644	58,061		83,830		83,830	24,027 (+9,920)	742	58,061 (-9,920)
Mule Canyon	Desert shrub		2,839	1,369		4,208		4,208	2,839		1,369
	Half shrub			9,284		9,284		9,284			9,284
	Unsuitable			7,895		7,895		7,895			7,895
	Total		2,839	18,548		21,387		21,387	2,839		18,548
Mustang Spring	Grassland	583		1,830		2,413		2,413	2,413		
	Desert shrub		1,781			1,781		1,781	1,781		
	Pinyon-juniper		5,754			5,754		5,754		5,754	
	Total	583	7,535	1,830		9,948		9,948	4,194	5,754	
Pakoon	Creosotebush		1,712	5,275		6,987		6,987		1,712	5,275
	Desert shrub	5,645	14,939	19,730		40,314		40,314	5,645	14,939	19,730
	Total	5,645	16,651	25,005		47,301		47,301	5,645	16,651	25,005
Pakoon Spring	Half shrub		2,690			2,690		2,690		2,690	
	Creosotebush		13,679			13,679		13,679		13,679	
	Annuals			9,403		9,403		9,403		9,403	
	Desert shrub		2,870	2,500		5,370		5,370		2,870	2,500
	Blackbrush			3,115		3,115		3,115			3,115
	Grassland	465				465		465	465		
	Total	465	19,239	15,018		34,722		34,722	465	18,542	5,618
Unallotted	Annuals			534		534		534			534
	esert shrub		1,180	41		1,221		1,221		1,180	41
	Total		1,180	575		1,755		1,755		1,180	575
Parashaunt (actual trend)	Grassland	4,602				4,602		4,602	4,602		
	Sagebrush		774	89	774	89		863	774		89
	Conifer			4,472		4,472		4,472			4,472
	Pinyon-juniper			47,972		47,972		47,972			47,972
	(treatment)								(6,400)		
	Desert shrub		60,541	12,015		72,556		72,556		60,541	12,015
	Half shrub		3,107				3,107	3,107		3,107	
	Unsuitable			69,126			69,126	69,126			69,126
	Total	4,602	64,422	133,674	774	129,690	72,233	202,698	5,376 (+6,400)	63,648	133,674 (-6,400)

APPENDIX 3-1 (continued)

Allotment	Vegetation Type	Current Range Condition (Acres) Good	Fair	Poor	Apparent Range Trend Up	Static	Down	Total Acres	Proposed Action and Alternative 3 Range Condition Good	Fair	Poor
Hidden & Sullivan	Juniper	115	12,189	18,335		30,524	115	30,639	115	12,189	18,335
	Sagebrush		990	2,260		3,250		3,250		990	2,260
	Desert shrub		90	1,012		1,102		1,102		90	1,012
	Shortgrass	71			71			71	71		
	Total	186	13,269	21,607	71	34,876	115	35,062	186	13,269	21,607
Highway	Creosotebush			6,514		6,514		6,514			6,514
	Desert shrub		3,409	497		3,906		3,906	3,409		497
	Unsuitable			535		535		535			535
	Total		3,409	7,546		10,955		10,955	3,409		7,546
Home Ranch	Pinyon-juniper			57,969		57,969		57,969			57,969
	Sagebrush			437		437		437			437
	Total			58,406		58,406		58,406			58,406
Ivanpah (actual trend)	Pinyon-juniper		4,665				4,665	4,665		4,665	
	Sagebrush		8,590				8,590	8,590	8,590		
	Grassland	1,701					1,701	1,701	1,701		
	Total	1,701	13,255				14,955	14,955	10,291	4,665	
Jackson Tank (actual trend)	Grassland	7,228				7,228		7,228	7,228		
	Unsuitable			589		589		589			589
	Total	7,228		589		7,817		7,817	7,228		589
Jump Canyon	Snakeweed			11,298		11,298		11,298			11,298
	Pinyon-juniper (treatment)			11,600		11,600		11,600	(+11,600)		11,600
	Blackbrush			190		190		190			190
	Sagebrush		3,104			3,104		3,104	3,104		
	Unsuitable			1,177		1,177		1,177			1,177
	Total		3,104	24,265		27,369		27,369	3,104 (+11,600)		24,265
Lambing	Desert shrub		9,417	1,255		10,672		10,672		9,417	1,255
	Creosotebush			565		565		565			565
	Unsuitable			1,300		1,300		1,300			1,300
	Total		9,417	3,120		12,537		12,537		9,417	3,120
Link Spring	Desert shrub		1,166	18,941		20,107		20,107		1,166	18,941
	Pinyon-juniper		6,694			6,694		6,694		6,694	
	Annual grassland		1,208			1,208		1,208	1,208		
	Total		9,068	18,941		28,009		28,009	1,208	7,860	18,941
Last Chance	Blackbrush			1,963		1,963		1,963			1,963
	Pinyon-juniper		7,749			7,749		7,749		7,749	
	Total		7,749	1,963		9,712		9,712		7,749	1,963
Littlefield Free Use	Creosotebush			2,043		2,043		2,043			2,043
	Desert shrub		780			780		780		780	
	Total		780	2,043		2,823		2,823		780	2,043
Littlefield Community	Desert shrub	6,315	2,740	14,573		23,628		23,628	6,315	2,740	14,573
	Creosotebush			12,251		12,251		12,251			12,251
	Mountain shrub	2,918	1,638	6,639		11,195		11,195	4,556		6,639
	Pinyon-juniper		5,059	2,360		7,419		7,419		5,059	2,360
	Conifer			75		75		75			75
	Sagebrush			890		890		890			890
	Unsuitable			21,153		21,153		21,153			21,153
	Total	9,233	9,437	57,941		76,611		76,611	10,871	7,799	57,941
Little Tank (actual trend)	Grassland	5,965				1,491	4,474	5,965	5,965		
Little Wolf (actual trend)	Pinyon-juniper			4,970		4,970		4,970			4,970
	Mountain shrub			310		310		310			310
	Sagebrush		1,991		1,991			1,991	1,991		
	Total		1,991	5,280	1,991	5,280		7,272	1,991		5,280
Lizard	Desert shrub	2,865	3,090			5,955		5,955	5,955		
	Creosotebush		6,468			6,468		6,468		6,468	
	Unsuitable			763		763		763			763
	Total	2,865	9,558	763		13,186		13,186	5,955	6,468	763
Lower Hurricane (actual trend)	Grassland	35,374				23,701	11,670	35,374	35,374		
	Sagebrush	455				455		455	455		
	Unsuitable			8,696		8,696		8,696			8,696
	Creosotebush	958				958		958	958		
	Desert shrub	5,327				5,327		5,327	5,327		
	Total	42,114		8,696		39,137	11,670	50,810	42,114		8,696
Mainstreet (actual trend)	Grassland	41,026	4,559		16,280		29,305	45,585	45,585		
	Sagebrush (treatment)		32,716	16,853	27,278		22,291	49,569	32,716 (4,200)		12,653
	Pinyon-juniper (treatment)			10,121		10,121		10,121	(4,450)		10,121
	Annuals			1,103		1,103		1,103		1,103	
	Unsuitable			1,387			1,387	1,387			1,387
	Total	41,026	37,273	29,464	43,558	11,224	52,983	107,765	78,301 (+8,650)	1,103	24,161 (-8,650)

Allotment	Vegetation Type	Current Range Condition (Acres)			Apparent Range Trend			Total Acres	Proposed Action and Alternative 3 Range Condition		
		Good	Fair	Poor	Up	Static	Down		Good	Fair	Poor
Pa's Pocket	Grassland	430				430		430	430		
	Sagebrush	1,741				1,741		1,741	1,741		
	Creosotebush		2,548			2,548		2,548		2,548	
	Blackbrush		203			203		203		203	
	Half shrub		3,079			3,079		3,079		3,079	
	Unsuitable			512		512		512			512
	Total	2,171	5,830	512		8,513		8,513	2,171	5,830	512
Pat's Pond	Grassland	1,102	78			1,180		1,180	1,180		
	Annual forb			105		105		105		105	
	Total	1,102	78	105		1,285		1,285	1,180	105	
Penns Well	Grassland	991				991		991	991		
	Annual forb			52		52		52			52
	Pinyon-juniper			4,740		4,740		4,740			4,470
	Total	991		4,792		5,783		5,783	991		4,522
Pocum Tank	Sagebrush	3,010		5,402		8,412		8,412	3,010		5,402
Poverty (actual trend)	Grassland	38,656			28,042	1,692	8,922	38,656	38,656		
	Sagebrush			16,603	3,321		13,282	16,603			16,603
	(treatment)								(4,200)		
	Juniper			19,349		19,343		19,343			19,343
	(treatment)								(3,960)		
	Total	38,656		35,946	31,363	21,035	22,204	74,602	38,656 (+8,160)		35,946 (-8,160)
Purgatory Canyon	Desert shrub		1,960	2,687		4,647		4,647		1,960	2,687
	Creosotebush			1,002		1,002		1,002			1,002
	Unsuitable			1,213		1,213		1,213			1,213
	Total		1,960	4,902		6,862		6,862		1,960	4,902
Quail Canyon	Pinyon-juniper		2,277			2,277		2,277		2,277	
	Desert shrub		3,665			3,665		3,665		3,665	
	Half shrub			2,791		2,791		2,791		2,791	
	Total		5,942	2,791		8,733		8,733		8,733	
Sullivan Canyon (actual trend)	Sagebrush	230					230	230	230		
	Mountain shrub	1,088					1,088	1,088	1,088		
	Pinyon-juniper		1,081	8,803		8,803	1,081	9,884		1,081	8,803
	(treatment)								(3,120)		
	Creosotebush			973		973		973			973
	Desert shrub		2,943	9,861			12,804	12,804		2,943	9,861
	Total	1,318	4,024	19,637		9,776	15,203	24,979	1,318 (+3,120)	4,024	19,637 (-3,120)
Sullivan Tank	Sagebrush			4,528		4,528		4,528			4,528
	Juniper			9,022		9,022		9,022			9,022
	Total			13,550		13,550		13,550			13,550
Sunshine	Desert shrub		6,752	4,536		11,288		11,288	6,752		4,536
	Grassland	6,235				6,235		6,235	6,235		
	Total	6,235	6,752	4,536		17,523		17,523	12,987		4,536
Tassi	Desert shrub			123,397		123,397		123,397			123,397
Toquer Tank (actual trend)	Grassland	12,492			8,244	4,247		12,492	12,492		
Whiterock-Soapstone (actual trend)	Grassland	7,053			7,053			7,053	7,053		
	Sagebrush			3,443		3,443		3,443			3,443
	Pinyon-juniper			8,118		8,118		8,118			8,118
	Total	7,053		11,561	7,053	11,561		18,614	7,053		11,561
Wildcat	Sagebrush	275	1,087	10,397		11,759		11,759	1,362		6,497
	(treatment)								(3,900)		
	Grassland	410	3,250			3,660		3,660	3,660		
	Blackbrush			16,831		16,831		16,831			16,831
	(treatment)								(6,250)		
	Mountain shrub		5,138			5,138		5,138		5,138	
	Pinyon-juniper	885	26,089	22,490		49,464		49,464	885	26,089	5,490
	(treatment)								(17,000)		
	Annual grass			220		220		220			220
	Unsuitable			8,028		8,028		8,028			8,028
	Total	1,570	35,564	57,966		95,100		95,100	5,907 (+27,150)	31,227	37,066 (-27,150)
Wolfhole Mountain	Desert shrub			4,534		4,534		4,534			4,534
	(treatment)								(3,520)		
	Sagebrush			2,839		2,839		2,839			2,839
	Pinyon-juniper		974	5,939		6,913		6,913		974	5,939
	(treatment)								(5,400)		
	Total		974	13,312		14,286		14,286	(+8,920)	974	13,312 (-8,920)

APPENDIX 3-1 (continued)

		Current Range Condition (Acres)			Apparent Range Trend			Total	Proposed Action and Alternative 3 Range Condition		
Allotment	Vegetation Type	Good	Fair	Poor	Up	Static	Down	Acres	Good	Fair	Poor
Wolfhole Canyon	Desert shrub	567	4,640	8,949		14,156		14,156	567	4,640	8,949
	Creosotebush		2,956	2,734		5,690		5,690		2,956	2,734
	Annual grass			122		122		122			122
	Sagebrush	2,685	10,634	704		14,023		14,023	10,623	3,400	
	(treatment)								(3,400)		
	Grassland	3,970	487			4,457		4,457	4,457		
	Pinyon-juniper		4,457	3,166		7,623		7,623		4,457	3,166
	Total	7,222	23,174	15,675		46,071		46,071	15,647	12,053	14,961
									(+3,400)	(-3,400)	
Wolfhole Lake	Grassland/pinyon-juniper	8,785		1,174		9,959		9,959	8,785		1,174
	(treatment)								(4,120)		
	Sagebrush		2,784			2,784		2,784	2,784		
	Annuals			198		198		198		198	
	Unsuitable			80		80		80			80
	Total	8,785	2,784	1,452		13,021		13,021	11,569	198	1,254
									(+4,120)		
Utah allotments											
Mine Valley	Creosotebush			1,739		1,739		1,739			1,739
	Desert shrub		940			940		940	940		
	Blackbrush		500			500		500		500	
	Grassland	1,690				1,690		1,690	1,690		
	Sagebrush			490		490		490			490
	Pinyon-juniper			869		869		869			869
	Unsuitable			1,072		1,072		1,072			1,072
	Total	1,690	1,440	4,170		7,300		7,300	2,630	500	3,680
Cedar Pockets	Pinyon-juniper			2,190		2,190		2,190			2,190
	Desert shrub	2,985				2,985		2,985	2,985		
	(treatment)								(720)		
	Joshua tree		2,122			2,122		2,122	2,122		
	Grassland	40				40		40	40		
	Unsuitable			2,435		2,435		2,435			2,435
	Total	3,025	2,122	4,625		9,772		9,772	5,147		4,625
									(+720)		
Shelley	Grassland	2,190				2,190		2,190	2,190		
Snyder	Grassland	3,192				3,192		3,192	3,192		
	Sagebrush		316			316		316	316		
	Total	3,192	316			3,508		3,508	3,508		
Unallotted	Desert shrub		8,255			8,255		8,255		8,255	

APPENDIX 3-2
PROJECTED RANGE CONDITION: ALTERNATIVES 1, 2, 4, 5

		Full Stocking			Stocking By Condition			No Action Like Current Condition Throughout			Elimination Like Proposed Action Throughout		
Allotment	Vegetation	Good	Fair	Poor	Good	Fair	Poor	Good	Fair	Poor	Good	Fair	Poor
Beaver Dam Slope		Same as current condition			Same as proposed action			Same as current condition			Same as proposed action		
Belnap West		"			"			"			"		
Belnap East		"			"			"			"		
Black Rock		Same as proposed action			"			Same as proposed action			"		
Blake Pond		"			"			Same as current condition			Same as proposed action without land treatment		
Cedar Wash		Same as current condition			"			"			"		
Clay Spring		Same as proposed action			"			"			"		
Cottonwood		"			"			"			"		
Diamond Butte North and South	Same as current conditions												
Rosenberry	"												
Iverson	"												
Dripping Spring	"												
Duncan Tank		Same as current condition			Same as proposed action			Same as proposed action			Same as proposed action		
Grassie Mountain		Same as proposed action			"			"			Same as proposed action without land treatment		
Hidden and Sullivan		Same as current condition			"			Same as current condition			Same as proposed action		
Highway		"			"			"			"		
Home Ranch		Same as proposed action			"			"			"		
Ivanpah		Same as current condition			"			Same as proposed action			Same as proposed action without land treatment		
Jackson Tank		Same as proposed action			"			"			"		
Jump Canyon		"			"			"			"		
Lambing		"			"			Same as current condition			"		
Link Spring		"			"			"			"		
Last Chance		"			"			"			"		
Littlefield Community		"			"			"			"		
Littlefield Free Use	Creosotebush	Same as current condition					2,043	"			"		
	Desert shrub	"			780								
					780		2,043						
Little Tank		"			Same as proposed action			Same as proposed action			"		
Little Wolf		"			"			"			"		
Lizard		Same as proposed action			"			Same as current condition			"		
Lower Hurricane		"			"			Same as proposed action			"		
Mainstreet		"			"			"			"		
Mesquite Community		Same as current condition			"			Same as current condition			"		
Mormon Well		"			"			"			"		
Mt. Trumbull		"			"			"			"		
Mosby		"			"			"			"		
Mosby-Nay		"			"			"			"		
Unallotted		"			"			"			"		
Mud & Cane Spring		Same as proposed action			"			"			Same as proposed action		
Mule Canyon		Same as current condition			"			"			"		
Mustang Spring		"			"			"			"		
Pakoon		"			"			"			"		

APPENDIX 3-2 (continued)

Allotment	Vegetation	Full Stocking			Stocking By Condition			No Action Like Current Condition Throughout			Elimination Like Proposed Action Throughout		
		Good	Fair	Poor	Good	Fair	Poor	Good	Fair	Poor	Good	Fair	Poor
Pakoon Spring	Half shrub		"		2,690				"			"	
	Creosotebush					13,679							
	Annuals					9,403							
	Desert shrub					2,870	2,500						
	Blackbrush						3,115						
	Grassland				465								
					3,155	25,952	5,615						
Unallotted			"		Same as proposed action				"			"	
Parashaunt	Conifer			4,472		"		Same as proposed action			Same as proposed action without land treatment		
	Pinyon-juniper (treatment)	(+6,400)		47,972									
	Sagebrush		774	89									
	Blackbrush		60,541	12,015									
	Grassland		4,602										
	Half shrub		3,107										
	Unsuitable		69,126										
		(+6,400)	138,150	64,459 (-6,400)									
Pa's Pocket		Same as current condition				"		Same as current condition				"	
Pat's Pond			"			"			"			"	
Penns Well		Same as proposed action				"			"			"	
Pocum Tank			"			"			"			"	
Poverty			"			"		Same as proposed action				"	
Purgatory Canyon		Same as current condition				"		Same as current condition				"	
Quail Canyon			"			"			"			"	
Sullivan Canyon		Same as proposed action				"		Same as proposed action				"	
Sullivan Tank			"			"		Same as current condition				"	
Sunshine		Same as current condition				"			"			"	
Tassi			"			"			"			"	
Toquer Tank			"			"		Same as proposed action				"	
Whiterock-Soapstone			"			"			"			"	
Wildcat		Same as proposed action				"		Same as current condition			Same as proposed action		
Wolfhole Mountain			"			"			"			"	
Wolfhole Canyon			"			"			"			"	
Wolfhole Lake		Same as current condition				"			"			"	
Shelly			"			"			"			"	
Snyder			"			"			"			"	
Mine Valley			"			"			"			"	
Cedar Pockets			"			"			"			"	
Unallotted (w/Pakoon)			"			"			"			"	

APPENDIX 3-3

RANGE STUDIES

Attached are range studies, including utilization, actual use, and trend. The utilization from actual use data has been averaged by allotment by year from pasture data. The trend studies are detailed and should be studied well for a complete understanding of what is happening. The discussion in chapter 3 and the appendix cover what may occur in a trend plot.

The first and second part of trend studies show an overall trend, but some allotments show an upward trend in key species but an overall downward trend. This trend may be due to a large shrub dying out, but not yet being replaced by key species. The overall trend is obtained by adding the columns and putting the totals through the following formula:

$$\frac{\text{1st Trend Reading}}{100} = \frac{\text{2nd Trend Reading}}{x}$$

This formula will yield a trend figure, but each plot and its components must be examined to obtain a real picture of trend.

Little Wolf Allotment The key species (cool-season grasses and browse) are both trending up as a result of land treatment completed in 1970. Like most land treatments in the pinyon-juniper woodland, the treated area will be subject to the reinvasion of woodland type vegetation. The large increase in the trend index results from the production of desirable forage after chaining and seeding. Rotation grazing has helped improve and maintain this treatment area. The 54 percent average utilization is low enough to allow improvement.

Black Rock Allotment This allotment has a good trend index of 100 to 135, but most of the trend increase is a result of litter accumulation. The key species are changing little, and cool-season grasses in the seedings are trending down. The browse, of which most of the range consists, is static. Rainfall in this allotment ranges from 7 to 18 inches. The higher rainfall on Black Mountain offers more potential for improvement, but high utilization and heavy browse cover prevents large key species increases.

Toquer Tank Allotment The trend index on this allotment has increased from 100 to 118. This area is a desert grassland with some browse. The warm-season grass component has a distinct upward trend. No browse occurred in the trend plots. Utilization has been light and moderate, thus allowing considerable improvement.

Beaver Dam Slope Allotment The overall trend index has increased from 100 to 110, a good increase for the Mohave Desert. The cool- and warm-season grasses are trending down, whereas the browse (burro bush) is trending up, amounting to a static trend in key species. Although utilization is low—35 percent—it is too high for the arid Mohave Desert, especially since it occurs during the spring.

Mainstreet Allotment The operator has not complied with the grazing system of this allotment because of unreliable waters, especially in the summer country. The cool-season grasses are trending up, but warm-season grasses and browse are trending down. The overall trend index is improving from 100 to 106. The trend would show more improvement with utilization under 59 percent. Land treatment is needed in the summer country for further improvement.

Jackson Tank Allotment This allotment supports warm-season grasses only, and their trend is static at 56 percent utilization. With lower utilization the trend would probably improve more. The overall trend index is 100 to 103.

Clay Springs Allotment This allotment has an overall trend index of 100 to 101. Key species are all static and down as a result of a few years of overuse. The average utilization is now moderate, and trend is improving. This allotment has land treatment areas subject to natural ecological succession back to woodland, which would result in a down trend.

Little Tank Allotment This allotment has an overall trend of 100 to 100—static. The cool-season grasses show an up trend, whereas the warm-season grasses show a down trend. Warm-season grasses are the major part of the composition. The allotment was in good condition upon AMP implementation, and no change in condition has occurred. The high utilization (63 percent average) is the cause of slight down trend in key species.

Lower Hurricane Allotment This allotment has a slight down trend 100 to 97. Both warm-season grasses and browse have slightly increased. Decreased ground cover is causing the down trend. The allotment was in good condition upon grazing system implementation. No change in condition has occurred.

Sullivan Canyon Allotment This allotment has an index of 100 to 94. All key species are trending down as a result of high utilization (62 percent) and ecological succession in land treatment areas.

Mt. Trumbull Allotment The overall index has declined from 100 to 93. The warm-season grasses and browse are trending down, whereas cool-season grasses are trending up. Vegetation on nearly all of this allotment has been treated (key areas), and the woodland is reinvading slowly onto land treatment areas. The actual use studies, not utilization, show heavy use also occurring during most years.

Parashaunt Allotment This allotment shows an overall downward trend (100 to 93), mostly due to the down trend of the cool-season grasses. The warm-season grasses are trending up. Like all allotments with land treatment in the pinyon-juniper zones, treated areas are trending back to pinyon-juniper woodland, a down trend. Pinyon-juniper reinvasion occurs regardless of management. The reinvasion is occurring in the grazing exclosure also.

White Rock-Soapstone Allotment The trend index for this allotment has dropped 20 points. The allotment is in good condition. Cool-season grasses are trending down, and browse is trending up. This allotment, like the Parashaunt allotment, falls in the woodland zone and consists of large land treatment areas trending back to the climax woodland. This reversion to woodland is causing the down trend. Pinyon-juniper is also reinvading grazing enclosures.

Duncan Tank Allotment The decline on this allotment is great. Cool- and warm-season grasses are both trending down. Browse has a static trend. High utilization by livestock and ecological succession are causing the drop in trend.

Poverty Allotment The overall trend index for this allotment has increased from 100 to 102, basically remaining static. Warm-season grasses are increasing, but cool-season grasses and browse are trending down. Utilization has been high, holding key species trend down. Ecological succession to woodland in large chainings is responsible for species composition shifts causing a down trend or preventing an up trend.

APPENDIX 3-3

OVERALL TREND BY ALLOTMENT

BEAVER DAM SLOPE

Pasture	Plot	Year	Key Species	Cover	Seedlings	Litter	Total
2 Desert shrub	1	1970	100.0	7.7	-	.7	108.4
		1978	100.0	14.8	-	13.6	128.0
	2	1970	100.0	4.9	-	3.5	108.4
		1978	100.0	18.6	-	24.6	143.0
1 Desert shrub	3	1970	100.0	.7	2	2.0	104.7
		1976	100.0	.56	-	1.6	102.18
	4	1970	100.0	.7	-	2.0	102.7
		1974	77.3	1.5	-	0.0	78.8
3 Desert shrub	6	1974	100.0	3.6	-	2.0	106.3
		1978	100.0	7.7	-	14.2	121.9
	5	1974	100.0	6.2	-	6.2	112.0
		1978	100.0	7.7	-	25.4	133.0

$$\begin{array}{ccc} \underline{640} & \times & 705 \\ 100 & & \end{array}$$

Trend 100 ---- 110 up

Key Species	Cover
5 plots static	5 plots up
1 plot down	1 plot down
Static	Up

BLACK ROCK TREND

Pasture	Plot	Year	Key Species	Cover	Seedlings	Litter	Total
Lizard Creosotebush	17	1974	100.0	4.6	-	7.6	112.2
		1975	100.0	3.1	-	22.5	125.6
Blackbrush	16	1974	100.0	9.7	-	4.4	114.1
		1976	100.0	11.7	-	8.8	120.5
Low Mountain Mountain shrub	9	1969	20.0	25.0	-	3.0	48.0
		1974	13.6	39.1	-	20.8	73.5
		1976	32.2	38.6	3	66.8	140.7
Black rock Sagebrush	6	1969	100.0	5.6	-	7.7	113.3
		1978	100.0	3.5	9	17.15	129.65
Maple Mountain shrub	14	1969	31.0	7.7	5	2.0	45.7
		1975	32.0	20.7	-	16.0	68.0

$$\begin{array}{ccc} \underline{432.2} & \times & 582 \\ 100 & & \end{array}$$

Key Species	Cover
3 plots static	2 plots down
2 plots up	3 plots up
Static	Up

CLAY SPRINGS

Pasture	Plot	Year	Key Species	Cover	Seedlings	Litter	Total
1 Grass	15	1969	91.0	7.7	-	4.2	102.9
		1977	66.0	5.3	-	2.4	74.9
2 Grass	17	1969	100.0	8.4	-	18.9	126.3
		1978	100.0	1.6	5	28.0	134.6
3 Grass	14	1969	100.0	3.5	-	30.1	133.6
		1978	100.0	2.9	-	94.3	197.3
4 Blackbrush	8	1969	87.5	5.6	-	2.1	95.2
		1974	46.1	1.8	4	6.5	58.4
5 Blackbrush	11	1969	87.5	5.6	-	2.1	95.2
		1974	46.1	1.8	4	6.5	58.4
6 Grass	12	1969	92.0	8.4	-	2.8	103.2
		1975	94.8	4.0	6	3.08	107.9
7 Seeding	1	1969	75.0	2.8	3	4.2	85.0
		1977	91.7	2.4	-	2.6	96.2
8 Seeding		1969	85.7	4.9	4	3.5	98.1
		1978	95.0	5.1	1	17.2	118.3

$$\begin{array}{ccc} \underline{855.5} & \times & 865.7 \\ 100 & & \end{array}$$

100 ---- 101 up

Key Species	Cover
2 plots static	7 plots down
3 plots up	1 plot up
3 plots down	
Static	Down

DUNCAN TANK TREND

Pasture	Plot	Year	Key Species	Cover	Seedlings	Litter	Total
Brown Sagebrush	3	1970	61.7	15.58	-	3.5	80.7
		1976	41.2	10.1	2	8.8	62.2
Back Sagebrush	2	1970	100.0	7.1	-	2.4	109.55
		1974	95.1	5.6	1	5.7	107.4
		1978	100.0	7.5	-	.5	108.7
Mule Canyon Half shrub	6	1974	88.0	7.0	1	4.8	112.8
		1977	37.0	6.8	-	12.6	57.1

$$\begin{array}{ccc} \underline{297} & \times & \underline{228} \\ 100 & & x \end{array}$$

Key Species	Cover
2 plots down	2 plots down
1 plot static	1 plot up
Down	Down

IVANPAH TREND

Pasture	Plot	Year	Key Species	Cover	Seedlings	Litter	Total
1	10	1969	73.0	10.5	4	6.3	93.8
		1976	100.0	.97	-	11.9	113.87
2	8	1969	88.0	5.6	2	2.1	97.7
		1974	11.2	7.1	-	5.5	23.8
		1978	8.2	17.7	-	19.4	45.5
3	2	1969	67.0	10.5	-	2.1	79.6
		1974	74.4	3.9	5	5.2	89.0
		1978	72.0	2.7	-	4.06	78.70

$$\begin{array}{ccc} \underline{264} & \times & 222 \\ 100 & & x \end{array}$$

Key Species	Cover
2 plots up	2 plots down
1 plot down	1 plot up
Up	Down

JACKSON TANK TREND

Pasture	Plot	Year	Key Species	Cover	Seedlings	Litter	Total
1 Grass	1	1969	100.0	3.5	-	2.8	106.3
		1978	100.0	.77	-	12.2	113.02
2 Grass	3	1969	100.0	8.1	1	3.5	112.6
		1975	98.3	4.3	-	9.4	112.18

$$\begin{array}{ccc} \underline{218} & \times & \underline{225} \\ 100 & & 100 \end{array}$$

100 ---- 103 Trend Up

Key Species	Cover
1 plot static	2 plots down
1 plot slightly down	
Static	Down

LITTLE TANK TREND

Pasture	Plot	Year	Key Species	Cover	Seedlings	Litter	Total
NE Pasture Grass	3	1969	87.5	5.6	-	7.7	100.0
		1977	87.5	9.0	-	5.8	102.0
SE Pasture	5	1969	70.0	7.0	-	.7	77.7
		1975	38.0	3.6	-	3.4	45.0
		1978	50.0	2.24	5	3.3	60.6
SW Pasture Grass	7	1969	100.0	11.2	-	2.8	114.0
		1974	98.9	13.4	2	27.2	139.8
		1975	94.0	12.0	-	21.0	127.0
NW Pasture Grass		1969	100.0	3.5	-	1.4	104.9
		1976	98.8	3.3	-	3.9	105.42

$$\begin{array}{ccc} \underline{395} & \times & 394 \\ 100 & & 102 \end{array}$$

Trend 100 ---- 100

Key Species	Cover
1 static	2 up
3 plots down	2 down
Down	Static

APPENDIX 3-3 (continued)

LITTLE WOLF TREND

Pasture	Plot	Year	Key Species	Cover	Seedlings	Litter	Total
1 Seeding	1	1970	-	-	2	-	2.0
		1977	92.0	1.3	-	2.3	96.2
2 Chaining	2	1970	-	-	-	3.5	3.5
		1976	-	-	-	13.9	13.9
3 Seeding	5	1970	-	-	2	-	2.0
		1978	86.0	17.08	-	70.0	173.02

$$\frac{7.5}{100} \times 283$$

100 ---- 3,773

Key Species	Cover
1 plot static	2 plots up
2 plots up	1 plot static
Up	Up

LOWER HURRICANE TREND

Pasture	Plot	Year	Key Species	Cover	Seedlings	Litter	Total
Parker	1	1972	100.0	7.0	-	3.14	110.14
White sage		1976	89.7	8.5	1	6.6	105.9
St. George	14	1974	100.0	13.5	1	5.4	120.04
Desert shrub		1977	100.0	1.05	1	1.4	103.4
Force	4	1972	100.0	8.7	-	6.5	115.3
White sage		1975	85.7	9.3	4	22.6	122.03
North Gyp	6	1972	100.0	5.2	1	8.2	114.51
Grass		1975	100.0	10.08	1	11.9	122.98
South Gyp	6	1972	70.5	5.9	-	22.5	99.07
White sage		1976	82.8	4.4	-	19.1	107.3
Pete	7	1972	98.6	10.3	-	6.02	115.06
Grass/ Desert shrub		1974	47.8	17.8	7	14.9	87.6
Black Canyon	13	1975	100.0	4.9	-	9.8	114.7
Grass		1978	100.0	4.4	1	14.49	119.9

$$\frac{100}{788.82} \times \frac{97}{768.11}$$

Trend Static 100 ---- 97

Key Species	Cover
3 plots static	4 plots up
3 plots down	3 plots down
1 plot up	
Static	Up

Range in good condition upon AMP implementation

MAINSTREET TREND

Pasture	Plot	Year	Key Species	Cover	Seedlings	Litter	Total
Twin Tanks	1	1976	81.0	6.23	10	1.61	98.84
		1975	49.21	8.82	2	2.59	62.62
		1973	79.69	4.48	8	2.59	94.76
Temple Trail	1	1978	100.01	6.51	1	4.83	112.35
		1975	100.0	7.91	1	2.66	111.57
		1973	100.0	5.32	6	3.64	108.96
Square Pond	1	1978	36.84	5.32	-	4.2	46.36
		1977	91.3	1.61	4	2.03	98.94
		1973	100.0	2.24	7	1.33	110.57
Round Pond	1	1978	83.1	4.97	0	9.24	97.31
		1973	100.0	2.94	4	6.23	113.17
Salaratus	1	1977	100.0	3.36	7	1.61	111.97
		1974	100.0	9.45	2	2.03	113.48
		1973	100.0	5.88	6	3.22	115.10
Mudhole	1	1976	59.35	3.96	-	5.25	68.56
		1975	77.77	3.78	3	5.25	89.80
		1973	81.18	5.95	7	4.2	98.33
Little Joe	1	1976	1.5	9.31	-	13.44	24.25
		1974	5.0	4.48	-	10.29	19.77
		1973	10.52	2.66	-	7.0	20.18
Highley	1	1978	100.0	6.51	-	9.0	115.51
		1975	100.0	6.44	-	4.76	111.2
		1973	100.0	5.46	2	5.11	112.57
Bishop & Burr	1	1977	88.36	4.81	3	3.99	100.16
		1975	68.16	12.53	1	7.21	88.9
		1973	80.65	4.34	7	10.5	102.49
Cecil	1	1978	56.92	4.55	1	5.88	68.35
		1976	88.3	6.58	-	6.93	101.81
		1973	86.5	4.7	8	6.4	105.6
Calving	1	1976	85.86	3.96	2	8.624	100.44
		1974	78.83	5.94	2	2.38	89.16
		1973	74.0	3.42	3	1.05	81.47
Sullivan	1	1978	62.07	2.03	-	3.5	67.6
		1976	100.0	1.806	1	7.399	109.205
		1973	20.23	6.23	-	1.54	28.0
Cox-Atkin	2	1978	28.09	3.115	-	5.88	37.085
		1976	52.88	1.04	-	9.17	83.09
		1973	52.4	1.47	-	3.08	56.95
Dutchman	2	1978	46.94	3.43	4	9.45	63.82
		1974	26.03	5.11	-	9.17	40.31
		1973	37.84	7.77	6	15.68	67.29
Englestead	1	1977	94.45	1.26	2	3.15	100.86
		1973	51.61	6.51	8	5.88	72.0

$$\frac{1,213}{100} \times \begin{array}{c} 1,286 \\ x \end{array}$$

100 ---- 106 Manual Method

Key Species	Cover
5 plots up	5 plots down
3 plots static	9 plots up
6 plots down	1 plot static
Static	Up

APPENDIX 3-3 (continued)

MT. TRUMBULL TREND

Pasture	Plot	Year	Key Species	Cover	Seedlings	Litter	Total
Rim	1	1974	79.8	16.5	2	9.2	107.5
Seeding		1978	75.0	14.28	3	8.82	101.10
N. Stock	3	1970	91.0	35.0	-	3.0	129.0
Chained		1977	94.0	11.62	2	5.6	113.0
Side of Mountain	7	1974	83.0	12.6	4	8.8	98.4
Grass		1978	54.0	12.3	2	22.26	90.79
Whitmore	5	1970	100.0	4.5	4	2.0	110.0
Chained Pinyon-juniper		1976	100.0	1.9	2	6.7	110.62

$$\frac{444}{100} \times \frac{414}{x}$$

100 ---- 93 static trend to slightly down

Key Species	Cover
2 plots down	4 plots down
1 static	
1 up	
Down	Down

PARASHAUNT TREND

Pasture	Plot	Year	Key Species	Cover	Seedlings	Litter	Total
Lake Flat	1	1974	100.0	1.1	4	52.5	157.6
Pinyon-juniper/		1977	9.0	5.6	-	19.5	44.1
Sagebrush							
Kelly	4	1974	84.0	21.9	2	8.4	115.4
Sagebrush/ Pinyon-juniper		1978	94.0	16.3	-	17.5	127.8
Twin Point	6	1974	27.0	1.9	-	49.0	77.9
Pinyon/juniper		1978	29.0	.49	-	100.1	129.5
Salthouse East	7	1974	82.0	11.6	-	7.7	101.3
Grass		1978	99.0	12.4	-	25.9	137.3
Garrett	9	1974	94.0	6.2	1.0	4.4	105.7
Half shrub		1977	71.3	5.4	-	.3	77.1
Upper Snap	11	1974	93.0	5.8	-	5.5	104.3
Half shrub		1978	68.0	4.4	-	7.8	80.3
Tincanbetts	13	1974	59.0	2.4	-	2.5	63.9
Annuals		1977	63.0	1.1	-	2.4	66.5
Neilson	15	1974	98.0	4.0	-	19.0	122.0
Pinyon-juniper		1977	99.0	6.9	-	2.8	108.7
Yellowjohn	18	1974	34.0	7.9	-	14.4	56.3
Rabbitbush		1978	42.0	6.9	-	17.8	66.7

$$\frac{904}{100} \times \frac{838}{x}$$

100 ---- 93 down

Key Species	Cover
6 plots up	3 plots up
3 plots down	6 plots down
Up	Down

POVERTY MOUNTAIN TREND

Pasture	Plot	Year	Key Species	Cover	Seedlings	Litter	Total
Childers	22	1974	100.0	7.77	1	3.64	112.41
		1977	100.0	4.27	10	1.05	115.32
Calf	17	1974	76.67	2.10	-	1.54	80.31
		1977	80.01 + 4	1.00	1	.77	82.83
Keller	15	1974	100.0	4.55	1	8.47	114.02
		1978	100.0	23.03	-	29.61	152.64
Rosenberry	14	1974	63.0	5.67	2	5.18	75.85
		1978	81.65	7.63	-	4.83	94.11
Dave Pond	7	1974	100.0	8.75	1	2.38	112.13
		1978	100.0	6.79	-	5.88	112.67
Poverty Mountain	26	1974	100.0	6.72	-	3.64	110.36
		1978	100.0	1.08	-	9.31	110.39
Hidden Pump	27	1974	40.0	4.2	1	11.34	56.54
		1978	8.7	1.61	-	8.61	18.92
Zumwalt		1976	61.15	9.73	-	2.45	73.33
		1978	56.18	12.46	1	13.02	82.66
Bull Pond		1974	96.06	8.89	-	2.45	107.40
			68.50	8.89	-	16.8	94.19
Hy Pond	4	1974	100.0	7.56	1	8.54	117.1
		1978	89.01	6.37	-	8.75	104.13
Bishop Burr	6	1974	52.05	10.22	6	5.36	73.63
		1978	69.52	7.35	-	26.67	103.54
Mustang	1	1974	26.41	7.42	1	38.99	73.82
		1977	82.35	2.38	3	7.49	95.22
New Spring	29	1974	77.43	15.82	-	15.05	108.3
		1978	98.92	12.95	-	19.11	130.98
Christman	23	1974	85.71	6.37	-	13.79	105.87
		1978	31.02	15.12	-	10.29	56.43

$$\frac{1{,}321}{100} \times \frac{1{,}354}{x}$$

100 ---- 102 Slightly up

Key Species	Cover
3 plots static	2 plots up
5 plots down	11 plots down
5 plots up	
Static	Down

SULLIVAN CANYON TREND

Pasture	Plot	Year	Key Species	Cover	Seedlings	Litter	Total
Lower Sullivan	14	1974	-	3.9	-	6.0	9.9
Grass		1976	-	.49	-	3.64	4.13
Mountain Sheep	13	1974	40.0	3.5	-	1.4	44.9
Desert shrub		1978	28.0	6.3	-	3.8	38.15
	12	1974	100.0	9.1	-	3.2	112.0
		1978	100.0	7.9	1	19.8	128.81
Lizard	17	1974	100.0	2.7	-	3.0	105.7
Desert shrub		1977	95.0	5.9	-	3.5	105.1
New	2	1969	100.0	3.5	1.0	2.1	106.6
Seeding		1978	14.0	13.5	-	7.2	34.7
Upper Sullivan	11	1975	38.5	4.6	-	9.8	52.9
Sagebrush		1977	31.-	.91	-	5.11	37.0
Black Rock	A	1969	79.0	9.8	-	7.7	96.5
Neck West Seeding		1977	50.0	9.2	1	39.8	100.0
East	B	1969	100.0	2.1	1	2.8	105.9
Seeding		1974	75.8	5.8	-	3.2	84.8
Twin Pine	8	1969	100.0	8.4	-	2.1	110.5
Seeding		1976	97.0	9.5	11	16.5	134.2
Trails End	1	1969	100.0	6.3	-	9.8	116.1
Seeding		1978	97.0	6.5	-	38.5	142.0

$$\frac{856}{100} \times \frac{806}{x}$$

100 ---- 94

Key Species	Cover
8 plots down	4 plots down
2 plots static	6 plots up
Down	Up

APPENDIX 3-3 (continued)

TOQUER TANK TREND

Pasture	Plot	Year	Key Species	Cover	Seedlings	Litter	Total
1 Grass	1	1969	58.5	2.38	-	14.7	75.8
		1978	97.0	2.24	-	7.14	106.38
3 Grass	6	1969	100.0	8.4	3	3.5	111.9
		1976	100.0	7.2	9	11.06	127.27
2 Grass	3	1969	28.0	12.6	-	5.6	45.9
		1977	34.0	6.3	1	1.05	42.3

$$\frac{100}{233.6} \times \frac{118}{277.95}$$

100 ---- 118 Up

Key Species	Cover
2 plots up	3 plots down
1 plot static	
Up	Down

WHITEROCK-SOAPSTONE TREND

Pasture	Plot	Year	Key Species	Cover	Seedlings	Litter	Total
1 Grass	4	1969	100.0	6.3	-	2.1	108.0
		1978	72.0	1.7	-	26.0	99.0
2 Chain Grass	1	1969	-	5.6	-	3.5	9.0
		1976	2	3.4	1	9.1	15.6
	2	1969	64.0	7.7	5	-	77.0
		1974	99.0	8.7	8	5.6	121.0
3 Grass	3	1969	100.0	1.4	6	39.0	147.0
		1977	-	4.8	-	31.0	37.0

$$\frac{341}{100} \times \frac{272}{x}$$

100 ---- 80 Down Trend

Auxillary Plots

2 Sagebrush	15	1969	76.0	5.6	-	1.4	83.0
		1978	42.0	2.16	-	7.77	51.93
1 Seeding	10	1969	66.0	4.2	1	1.4	73.0
		1978	90.0	7.0	-	14.49	112.0
Seeding	11	1969	100.0	2.8	1	2.8	106.6
		1978	4.0	7.5	2	10.01	24.0

$$\frac{262.6}{100} \times \frac{187.93}{x}$$

100 ---- 71.5 Trend down

APPENDIX 3-3 (continued)

YEARLY AVERAGE
UTILIZATION DATA
PER ALLOTMENT

Allotment			
Beaver Dam Slope	1978	39%	
	1977	30%	
	1976	40%	
	1975	43%	
	1974	23%	
	1972	37%	
Black Rock	1978	45%	
	1977	58%	
	1976	55%	
	1975	77%	
	1972	63%	
	1971	66%	
Clay Springs	1978	50%	
	1977	45%	
	1976	52%	
	1975	60%	
	1973	22%	weak*
	1972	80%	
	1971	41%	weak*
Duncan Tank	1977	27%	
	1976	31%	
	1975	69%	
	1973	56%	
	1971	75%	
Jackson Tank	1978	43%	
	1977	41%	
	1976	40%	
	1975	58%	
	1972	80%	
	1971	60%	
	1970	70%	
Parashaunt	1977	48%	
	1976	44%	
	1975	42%	
Lower Hurricane	1978	31%	
	1977	45%	
	1976	43%	
	1975	42%	
	1973	72%	
	1972	73%	weak*
	1971	53%	weak*

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*Data are considered weak because they are based on too few readings to determine the year's average.

Allotment			
Little Tank	1978	49%	
	1977	45%	
	1976	48%	
	1975	64%	
	1974	72%	
	1973	69%	
	1972	80%	weak*
	1971	77%	weak*
Little Wolf	1977	58%	
	1976	23%	
	1975	50%	
	1974	84%	
Mt. Trumbull	1978	35%	weak*
	1977	30%	weak*
	1976	49%	
	1975	34%	
Mainstreet	1978		
	1976	58%	
	1975	58%	
	1974	60%	
Poverty	1978	37%	Incomplete
	1977	61%	
	1976	No Reading	
	1975	66%	
	1974	55%	
Sullivan	1977	67%	
	1976	48%	
	1975	67%	
	1974	56%	
	1970	72%	
Toquer Tank	1978	49%	
	1977	10%	
	1976	34%	
	1975	45%	
	1973	50%	
Whiterock-Soapstone	1978	53%	
	1977	53%	
	1976	50%	
	1975	51%	
	1971	37%	

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*Data are considered weak because they are based on too few readings to determine the year's average.

APPENDIX 3-3 (continued)

ACTUAL USE

Allotment	Year	F.R. AUMs Actual Use
Beaver Dam Slope	1978	638
	1977	906
	1976	856
	1972	809
	F.R. Estimated Carrying Capacity:	900 AUMs
Black Rock	1978	1,399
	1977	1,475
	1976	1,585
	1975	570
	1972	935
	1971	904
	1970	1,040
	F.R. Estimated Carrying Capacity:	1,478 AUMs
Clay Springs	1977	1,061
	1976	1,963
	1975	1,054
	1974	798
	1973	834
	1972	1,011
	F.R. Estimated Carrying Capacity:	960 AUMs
Duncan Tank	1977	385
	1976	377
	1975	182
	1974	384
	1973	540
	1972	538
	1971	223
	1970	532
	F.R. Estimated Carrying Capacity:	288 AUMs
Ivanpah	1977	654
	1976	841
	1975	1,019
	1974	793
	1972	828
	F.R. Estimated Carrying Capacity:	852 AUMs
Jackson Tank	1977	770
	1976	744
	1975	742
	1974	986
	1973	290
	1972	916
	F.R. Estimated Carrying Capacity:	803 AUMs

Allotment	Year	F.R. AUMs Actual Use
Little Tank	1977	668
	1976	712
	1975	854
	1974	640
	1973	436
	1972	479
	1971	438
	F.R. Estimated Carrying Capacity:	803 AUMs
Little Wolf	1977	297
	1976	294
	1975	325
	F.R. Estimated Carrying Capacity:	640 AUMs
Mt. Trumbull	1977	1,217
	1976	1,242
	1975	1,218
	1974	898
	1972	997
	F.R. Estimated Carrying Capacity:	1,162 AUMs
Mainstreet	1977	8,930
	1976	8,386
	9175	9,183
	F.R. Estimated Carrying Capacity:	10,055 AUMs
Poverty	1977	5,516
	1976	5,344
	1975	5,151
	F.R. Estimated Carrying Capacity:	5,344 AUMs
Sullivan Canyon	1977	927
	1976	2,268
	1971	502
	F.R. Estimated Carrying Capacity:	1,149 AUMs
Toquer Tank	1978	830
	1977	993
	1976	1,080
	1972	1,389
	F.R. Estimated Carrying Capacity:	1,612 AUMs
Whiterock-Soapstone	1978	1,293
	1977	1,233
	1976	1,089
	1975	1,103
	1974	1,577
	F.R. Estimated Carrying Capacity:	1,120 AUMs
Parashaunt	1977	3,294
	1976	3,376
	1975	3,579
	1974	2,921
	F.R. Estimated Carrying Capacity:	4,416 AUMs
Lower Hurricane	1977	7,791
	1976	3,673
	1975	4,731
	1974	3,995
	1972	3,887
	F.R. Estimated Carrying Capacity:	4,656 AUMs

APPENDIX 3-4

PRESENT AND PROJECTED USABLE PRODUCTION: PROPOSED ACTION AND ALTERNATIVE 3

Allotment	Vegetation Subtype	Acres	Current Usable Production/Acre Air Dry Pounds	Current AUMS	Proposed Action Projected Usable Production/Acre Air Dry Pounds	Proposed Action Alternative 3 Projected AUMs
Beaver Dam Slope	Desert shrub (poor)	13,719	46.9	805	46.9	805
	Creosotebush (poor)	21,251	25.4	675	25.4	675
	Total			1,398		1,398
Belnap West	Grassland (fair)	1,165	85.0	124	98.0	142
	Sagebrush/Grassland (fair)	2,231	54.2	150	65.5	181
	Total			274		323
Belnap East	Grassland	6,744	69.1	583	79.0	666
	Sagebrush	2,966	57.4	213	57.4	213
	(treatment)*	(2,120)				(255)
				796		879
Black Rock	Grassland	443	184.0	102	211.6	117
	Sagebush	741	133.8	123	161.8	149
	Mountain Shrub	3,789	134.0	635	134.0	635
	Conifer	1,391	100.0	174	100.0	174
	Pinyon-Juniper	17,578	51.3	1,129	51.3	1,129
	(treatment)	(2,400)				(480)
	Creosotebush	8,671	49.0	532	49.0	532
	Desert shrub	3,702	46.2	214	46.2	214
	(treatment)	(2,800)				(230)
	Total			2,909		2,950
Blake Pond	Desert shrub	5,499	54.4	374	81.0	556
	(treatment) (fair)	(1,000)			(86.0)	(107)
	Sagebrush	2,660	66.1	220	80.0	265
	(treatment) (fair)	(4,400)				(444)
	Snakeweed (fair)	3,827	60.6	290	60.6	290
	Juniper (fair)	3,143	53.2	209	53.2	209
	Creosotebush (fair)	4,059	45.3	230	45.3	230
	Shadscale (poor)	1,535	33.8	65	33.8	65
	Total			1,388		1,615
Cedar Wash	Desert shrub	9,368	27.9	327	41.0	479
Clay Spring	Grassland	4,414	127.0	701	146.0	805
	Pinyon-juniper	2,197	44.7	123	44.7	123
	Desert shrub	4,962	46.2	287	46.2	287
	Annuals	430	61.5	33	97.1	52
				1,144		1,267
Cottonwood	Pinyon-juniper	7,297	69.8	637	69.8	637
	(treatment) (poor)	(1,480)				(202)
	Snakeweed (poor)	2,596	40.0	130	40.0	130
	Desert shrub (poor)	1,481	42.1	78	42.1	78
	Grassland (poor)	471	69.6	71	82.0	48
	Annuals (poor)	20,933	39.4	1,038	62.6	1,639
	Sagebrush (poor)	377	44.5	21	44.5	21
	Total	33,155		1,945		2,553
Diamond Butte North	Grassland (fair)	1,451	58.9	107	67.7	123
	Grassland (good)	395	107.0	53	123.0	61
	Grassland (good)	1,133	117.8	167	134.5	190
	Grassland (good)	232	151.7	44	173.7	50
	Total	3,211		371		424
Diamond Butte South	Grassland (good)	1,915	86.0	206	99.0	237
	Saltbush (good)	165	101.8	21	117.8	24
	Total			227		261
	(Total of both)					(685)
Rosenberry	Grassland (good)	3,795	122.8	583	141.2	670
Iverson	Grassland (good)	2,403	117.8	354	135.4	405
Duncan Tank	Grassland (good)	3,624	104.6	474	119.6	542
	Pinyon-juniper (good)	736	97.8	90	112.0	103
	Desert shrub (good)	1,365	92.0	157	105.8	180
	Total			721		825
Dripping Spring	Desert shrub	1,294	33.7	546	33.7	546
Grassie Mountain	Pinyon-juniper	63,174	43.7	3,458	43.7	3,458
	(treatment) (fair)	(19,550)				(4,073)
	Sagebrush	35,817	53.5	2,397	64.7	2,898
	(treatment) (fair)	(7,680)				(900)
	Desert shrub (poor)	12,673	36.7	582	36.7	582
	Total			6,437		6,938
Hidden and Sullivan	Grassland (poor)	70	57.1	5	65.5	6
	Sagebrush (poor)	3,250	56.1	228	56.1	228
	Pinyon-juniper (poor)	30,639	56.4	2,162	56.4	2,162
	Desert shrub (poor)	1,102	35.5	49	35.5	49
	Total			2,444		2,445
Highway	Creosotebush (poor)	6,514	29.3	239	29.3	239
	Desert shrub (fair)	3,904	26.0	127	26.0	127
				366		366
Home ranch	Pinyon-juniper (poor)	57,969	24.1	1,750	24.1	1,750
	Sagebrush (poor)	437	93.3	51	93.3	51
	Total			1,800		1,800
Ivanpah	Pinyon-juniper (fair)	4,665	27.4	160	27.4	160
	Sagebrush (fair)	8,590	71.1	764	85.9	922
	Grassland (fair)	1,701	96.4	205	110.4	236
	Total			1,129		1,316

* Treatment acreage and AUMs in parenthesis ( ) are not subtracted from the total of the targeted subtype nor are the increased AUMs added into the projected AUM total. If the total AUMs from management and treatment are desired, add figures together.

Note: With one exception, no acreage is shown for unsuitable or inaccessible areas, since no AUMs were allotted for these types because of low production. The exception occurs on Wildcat allotment, where some AUMs on unsuitable range were allotted to bighorn sheep.

APPENDIX 3-4 (continued)

Allotment	Vegetation Subtype	Acres	Current Usable Production/Acre Air Dry Pounds	Current AUMS	Proposed Action Projected Usable Production/Acre Air Dry Pounds	Proposed Action Alternative 3 Projected AUMs
Wolfhole Mountain	Desert shrub (poor)	4,534	39.3	223	39.3	223
	(treatment)	(2,800)			(67.0)	(235)
	Sagebrush (poor)	2,839	73.2	260	73.2	260
	(treatment)	(720)			(100.0)	(90)
	Pinyon-juniper (poor)	7,060	57.6	509	57.6	509
	(treatment)	(5,400)			(115.0)	(780)
	Total			992		992
Wolfhole Canyon	Desert shrub (poor)	14,156	40.6	728	40.6	728
	Creosotebush (fair)	5,690	34.5	246	34.5	246
	Annual grass (poor)	122	45.9	7	72.9	11
	Sagebrush (fair)	14,023	39.1	686	47.3	829
	(treatment)	(3,400)			(80.0)	(340)
	Grassland (good)	4,457	79.5	443	91.4	509
	Pinyon-juniper	7,623	34.2	326	34.2	326
	(fair)			2,436		2,649
Whiterock-Soapstone	Grassland	7,053	79.9	705	79.9	705
	Sagebrush	3,443	49.2	212	49.2	212
	Pinyon-juniper	8,118	25.5	259	25.5	259
	Total			1,176		1,176
Wolfhole Lake	Grassland (good)	9,959	90.3	1,125	103.8	1,292
	(treatment)	(4,120)			(139.0)	(716)
	Sagebrush (fair)	2,784	77.5	270	93.7	326
	Annuals (poor)	198	48.4	12	76.9	19
	Total			1,407		1,637

Allotment	Vegetation Subtype	Acres	Current Usable Production/Acre Air Dry Pounds	Current AUMS	Proposed Action Projected Usable Production/Acre Air Dry Pounds	Proposed Action Alternative 3 Projected AUMs
Unalloted	Desert shrub	1,755	23.5	243	23.5	243
Utah Allotments						
Mine Valley	Creosotebush (fair)	1,739	16.1	35	16.1	35
	Desert shrub and Blackbrush (fair)	1,440	39.4	72	59.1	106
	Grassland (good)	1,690	77.6	164	89.2	188
	Sagebrush (poor)	490	44.0	27	44.0	27
	Pinyon-juniper (poor)	869	36.8	40	36.8	40
	Total			338		396
Cedar Pockets	Pinyon-juniper (poor)	2,190	36.8	101	36.8	101
	Desert shrub (fair)	5,107	46.3	296	69.4	443
	(treatment)	(720)			(69.4)	(62) No difference
	Grassland (good)	40	80.0	4	92.0	5
	Total			401		549

APPENDIX 3-4 (continued)

Allotment	Vegetation Subtype	Acres	Current Usable Production/Acre Air Dry Pounds	Current AUMS	Proposed Action Projected Usable Production/Acre Air Dry Pounds	Proposed Action Alternative 3 Projected AUMs
Mustang Spring	Grassland	2,413	61.3	185	72.0	219
	Pinyon-juniper	5,754	47.4	341	47.4	341
	Desert shrub	1,781	53.4	119	80.1	178
	Total			645		738
Pakoon	Desert shrub (poor)	40,316	21.0	1,061	21.0	1,061
	Creosotebush (poor)	6,985	10.4	91	10.0	91
	Total			1,152		1,152
Pakoon Spring	Half shrub (fair)	2,690	25.8	87	25.8	87
	Creosotebush (fair)	13,679	9.1	371	9.1	371
	Annuals (poor)	9,403	25.6	301	40.7	478
	Desert shrub (poor)	8,485	30.9	328	30.9	328
	Grassland (good)	465	72.2	41	83.0	48
	Total			1,128		1,312
Unalloted	Annuals (poor)	534	22.4	16	22.4	16
	Desert shurb (fair)	1,221	41.9	64	41.9	64
	Total			80		80
Parashaunt	Grassland	4,602	306.0	1,722	306.0	1,762
	Sagebrush	863	77.0	83	93.0	100
	Conifer	4,472	62.9	352	62.9	352
	Pinyon-juniper	47,972	59.4	3,565	59.4	3,565
	(treatment)	(6,400)				(1,000)
	Desert shrub	72,556	50.7	4,603	50.7	4,603
	Half shrub	3,107	50.7	197	50.7	197
	Total			10,522		10,579
Pa's Pocket	Grassland (good)	430	93.0	50	107.0	57
	Sagebrush (good)	1,741	43.6	95	52.7	115
	Creosotebush (fair)	2,548	31.0	99	31.0	99
	Saltbush (fair)	203	35.4	9	44.2	11
	Snakeweed (fair)	3,079	30.9	119	30.9	119
	Total			372		401
Pat's Pond	Grassland (good)	1,180	102.0	150	117.0	172
	Annual forb (poor)	105	22.2	3	22.2	3
	Total			153		175
Penns Well	Grassland (good)	991	108.0	134	154.0	190
	Pinyon-juniper (poor)	4,740	44.2	262	44.2	262
	Annuals (poor)	52	15.3	1	243.0	2
	Total			397		454
Pocum Tank	Sagebrush (fair)	8,412	48.5	510	58.6	617
Poverty	Grassland	38,656	99.4	4,806	114.3	5,523
	Sagebrush	16,603	47.4	984	47.4	984
	(treatment)	(4,200)			(94.0)	(494)
	Pinyon-juniper	19,343	38.9	943	38.9	943
	(treatment)	(3,960)			(142.0)	(705)
	Total			6,733		7,450
Purgatory Canyon	Desert shrub (poor)	4,647	49.5	255	44.5	255
	Creosotebush (poor)	1,002	27.9	35	27.9	35
	Total			290		290
Quail Canyon	Pinyon-Juniper (fair)	2,277	49.8	142	49.8	142
	Desert shrub (fair)	3,665	47.8	219	71.7	328
	Half shrub (poor)	2,791	40.7	142	40.7	142
	Total			503		612
Sullivan Canyon	Sagebrush (good)	230	160.0	46	184.0	53
	Mountain shrub (good)	1,088	108.0	147	108.0	147
	Pinyon-juniper (poor)	9,884	51.3	635	51.3	635
	(treatment)	(3,120)			(107.0)	(420)
	Creosotebush (poor)	973	39.4	48	39.4	48
	Desert shrub (good)	12,808	21.5	345	32.2	516
	Total			1,221		1,399
Sullivan Tank	Sagebrush (poor)	4,528	47.3	268	47.3	268
	Juniper (poor)	9,022	20.2	228	20.2	228
				496		496
Sunshine	Desert shrub (fair)	11,288	65.4	923	98.1	1,384
	Grassland (good)	6,235	108.0	849	124.2	968
				1,772		2,352
Shelly	Grassland (good)	2,190	80.0	219	92.0	251
Snyder	Grassland (good)	3,192	89.4	357	102.8	410
	Sagebrush (fair)	316	53.1	21	64.0	25
		3,508		368		435
Tasi-Black Willow	Desert shrub	123,397	19.1	2,955	19.1	2,955
Toquer Tank	Grassland	12,492	110.0	1,718	126.5	1,977
Wildcat	Sagebrush (poor)	11,759	95.9	1,411	95.9	1,411
	(treatment)	(3,900)			(94.0)	(459)
	Grassland (fair)	3,660	117.1	536	134.5	615
	Blackbrush (poor)	16,832	49.4	1,041	49.4	1,041
	(treatment)	(6,250)			(66.0)	(520)
	Mountain shrub (fair)	5,138	61.3	394	61.3	394
	Pinyon-juniper (fair)	49,464	57.5	3,561	57.5	3,561
	(treatment)	(17,000)			(133.0)	(2,833)
	Annual grass (poor)	220	36.3	10	57.7	16
	Unsuitable*	8,028	5.1	27	5.1	27
	Total			6,980		7,065

*AUMs alloted to Bighorn sheep on Cliffs

APPENDIX 3-4 (continued)

Allotment	Vegetation Subtype	Acres	Current Usable Production/Acre Air Dry Pounds	Current AUMS	Proposed Action Projected Usable Production/Acre Air Dry Pounds	Proposed Action Alternative 3 Projected AUMs
Jackson Tank	Grassland (good)	7,228	229.8	2,076	263.3	2,379
Jump Canyon	Snakeweed (fair)	11,298	70.2	992	70.2	992
	Pinyon-juniper	11,601	35.9	521	35.9	521
	(treatment)	(11,600)				(1,643)
	(poor)					
	Blackbrush (poor)	190	46.3	11	46.3	11
	Sagebrush (fair)	3,104	48.7	189	58.7	227
	Total			1,713		1,751
Lambing	Desert shrub (fair)	10,672	37.0	503	55.5	740
	Creosotebush (poor)	565	15.5	11	15.5	11
	Total			514		751
Link Spring	Desert shrub (fair)	20,107	35.0	882	35.0	882
	Pinyon-juniper (fair)	6,694	48.7	408	48.7	408
	Annual Grass (fair)	1,208	54.3	84	54.3	84
	Total			1,374		1,374
Last Chance	Blackbrush (poor)	1,963	38.7	295	38.7	95
	Pinyon-juniper (fair)	7,749	30.4	295	30.0	95
	Total			390		390
Little Tank	Grassland (good)	5,965	87.0	649	100.0	745
Little Wolf	Sagebrush	1,991	85.5	213	85.5	213
	Mountain shrub	310	118.0	46	118.0	46
	Pinyon-juniper	4,970	13.8	86	13.8	86
	Total			345		345
Littlefield Free Use	Creosotebush (poor)	2,043	34.4	88	34.4	88
	Desert shrub (fair)	780	47.1	46	70.6	68
	Total			134		156
Littlefield Community	Desert shrub (poor)	23,628	32.2	952	32.2	952
	Pinyon-juniper (fair)	7,419	56.8	527	56.8	527
	Creosotebush (poor)	12,251	21.0	322	21.0	322
	Mountain shrub (poor)	11,195	80.1	1,121	80.1	1,121
	Conifer (poor)	75	53.3	5	53.5	5
	Sagebrush (poor)	890	72.8	81	72.8	81
	Total			3,008 (+ 89 from unsuitable		3,008 (+ 89 from unsuitable)
Lizard	Desert shrub (fair)	5,955	43.3	323	64.9	483
	Creosotebush (fair)	6,468	37.1	300	37.1	300
	Total			623		783

Allotment	Vegetation Subtype	Acres	Current Usable Production/Acre Air Dry Pounds	Current AUMS	Proposed Action Projected Usable Production/Acre Air Dry Pounds	Proposed Action Alternative 3 Projected AUMs
Lower Hurricane	Grassland	35,371	78.5	3,473	90.2	3,991
	Sagebrush	455	63.2	36	76.4	44
	Creosotebush	951	46.7	56	46.7	56
	Desert shrub	5,327	59.7	398	59.7	398
	Total			3,963		4,489
Mainstreet	Grassland	45,585	97.5	5,559	112.1	6,389
	Sagebrush	49,569	44.3	2,745	53.6	3,321
	(treatment)	(4,200)			(93.3)	(490)
	Pinyon-juniper	10,121	62.5	791	62.5	791
	(treatment)	(4,450)			(126.0)	(702)
	Annuals	1,103	13.0	18	20.6	28
	Total			9,113		10,529
Mesquite Community	Desert shrub (poor)	30,628	29.9	1,145	29.9	1,145
	Snakeweed (poor)	4,391	30.9	171	30.9	171
	Mountain shrub (poor)	8,550	70.5	754	70.5	754
	Pinyon-juniper (poor)	3,485	32.7	143	32.7	143
	Annual grass (poor)	5,214	48.0	305	73.5	479
	Total			2,518		2,692
Mormon Well	Desert shrub (poor)	12,174	34.8	532	34.8	532
	Creosotebush (poor)	2,470	24.6	76	24.6	76
	Total			608		608
Mt. Trumbull	Grassland	8,259	139.5	1,441	139.5	1,441
	Sagebrush	2,185	16.1	44	16.1	44
	Pinyon-juniper	5,211	63.4	413	63.4	413
	Desert shrub	14,552	31.6	575	31.6	578
	Annual	220				
	Total			2,473		2,473
Mosby	Desert shrub (poor)	1,664	24.7	51	24.7	51
Mosby Nay	Annuals (poor)	5,325	16.7	117	26.5	192
	Creosotebush (poor)	1,373	31.4	57	31.4	57
	Desert shrub (poor)	6,865	21.8	367	21.8	367
	Mountain shrub (fair)	1,770	44.2	98	44.2	98
	Half shrub (poor)	2,223	20.8	58	20.8	58
	Total			693		772
Unalloted	Desert shrub (poor)	6,031	41.5	313	41.5	313
	Half shrub (fair)	270	26.6	9	26.6	9
Mud and Cane Spring	Mountain shrub (poor)	2,701	116.0	394	116.0	394
	Sagebrush (fair)	233	41.2	12	49.8	14
	Pinyon-juniper	43,777	29.3	1,606	29.3	1,606
	(treatment)	(4,160)			(114.0)	(594)
	(poor)					
	Blackbrush	12,934	38.7	627	38.7	627
	(treatment)	(5,760)			(76.3)	(550)
	(poor)					
	Grassland (good)	223	143.0	40	164.0	46
	Annuals	23,804	79.2	2,090	112.0	3,321
	(fair)			4,768		6,008
Mule Canyon	Desert shrub (fair)	4,208	49.2	259	73.8	388
	Half shrub	9,284	13.8	161	13.8	161
	(poor)			420		549

APPENDIX 3-5
PROJECTED USABLE PRODUCTION: ALTERNATIVES 1, 2, 4, 5

Allotment	Vegetation Subtype	Full Stocking Alternative 1		Stocking by Condition Alternative 2		No Action Alternative 4		Elimination of Grazing Alternative 5	
		Air Dry Pounds/Acre	AUMs	Air Dry Pounds/Acre	AUMs	Air Dry Pounds/Acre	AUMs	Air Dry Pounds/Acre	AUMs
Beaver Dam Slope	Desert Shrub	Same as current production		46.9	805	Same as current production		46.9	805
	Creosotebush			25.4	675			25.4	675
					1,398				1,398
Belnap West	Grassland	Same as current production		113.9	165	Same as current production		66.3	96
	Sagebrush			72.4	201			42.2	117
					366				213
Belnap East	Grassland	Same except		92.4	779	Same as current production		53.8	452
	Sagebrush			57.4	213			44.7	165
	(Treatment)	(96.2)	(255)	(96.2)	(255)				
					992				617
Black Rock	Grassland	Same as current production		246	136	Same as proposed action		143	79
	Sagebrush	except		178	164			103	96
	Mountain Shrub			134	635			134	635
	Conifer			100	174			100	174
	Pinyon-Juniper			51.3	1,129			51.3	1,129
	(Treatment)	(160)	(480)	(160)	(480)				
	Creosotebush			49	532			49	532
	Desert Shrub			62	286			36	167
	(Treatment)	(65.7)	(230)	(65.7)	(230)				
					3,056				2,812
Blake Pond	Desert Shrub	Same as proposed action		72	498	Same as current production		63	434
	Sagebrush			88	294			62	207
	(Treatment)			(81)	(444)				
	Snakeweed			80	384			47	224
	Juniper			53.2	209			53.2	209
	Creosotebush			45.3	230			45.3	230
	Shadscale			33.8	65			33.8	65
					1,680				1,369
Cedar Wash	Desert Shrub	Same as proposed action		37.3	437	Same as current production		32	374
Clay Spring	Grassland	Same as current production		170	938	Same as current production		114	628
	Pinyon-Juniper			44.7	123			44.7	123
	Desert Shrub			46.2	287			46.2	287
	Annuals			97.1	52			75.6	41
					1,400				1,079
Cottonwood	Pinyon-Juniper	Same as current production		69.8	637	Same as current production		69.8	637
	(Treatment)	except (109)	(202)	(109)	(202)				
	Snakeweed			40	130			40	130
	Desert Shrub			42.1	78			42	78
	Grassland			92.6	54			64	38
	Annuals			62.6	1,639			48	1,265
	Sagebrush			44.5	21			44.5	21
					2,559				2.169
Diamond Butte North	Grassland	Same as current production		78.9	143	Same as current production		52	95
	Grassland			143	70			111	47
	Grassland			156	222			104	148
	Grassland			202	58			104	39
					493				329
Diamond Butte South	Grassland	Same as current production		115	275	Same as current production		77	184
	Saltbush			135	28			91	19
					303				203
Rosenberry	Grassland	Same as current production		163	775	Same as current production		109	521
Iverson	Grassland	Same as current production		156	468	Same as current production		105	316
Duncan Tank	Grassland	Same as current production		139	631	Same as proposed action		92	420
	Pinyon-Juniper			130	119			87	80
	Desert Shrub			123	210			83	141
					960				641
Dripping Spring	Desert Shrub	Same as proposed action		33.7	546	Same as current production		33.7	546
Grassie Mountain	Pinyon-Juniper	Same, except		43.7	3,458	Same as current production		43.7	3,458
	(Treatment)	(166)	(4,073)	(166)	(4,073)				
	Sagebrush			71	3,187			50.4	2,259
	(Treatment)	(94)	(900)	(94)	(900)				
	Desert Shrub			36.7	582			36.7	582
					7,227				6,299
Hidden and Sullivan	Grassland	Same as current production		76	7	Same as current production		51	4
	Sagebrush			56.1	228			56.1	228
	Pinyon-Juniper			56.4	2,162			56.4	2,162
	Desert Shrub			35.5	49			35.5	49
					2,445				2,441
Highway	Creosotebush	Same as current production		29.3	239	Same as current production		29.3	239
	Desert Shrub			34	165			20	98
					404				337
Home Ranch	Pinyon-Juniper	Same as current production		24.1	1,750	Same as current production		24.1	1,750
	Sagebrush			93.3	51			93.3	51
					1,800				1,800
Ivanpah	Pinyon-Juniper	Same as current production		27.4	160	Same as proposed action		27.4	160
	Sagebrush			95	1,021			67	719
	Grassland			129	273			85.8	182
					1,454				1,061
Jackson Tank	Grassland	Same as proposed action		306	2,772	Same as proposed action		205	1,853
Jump Canyon	Snakeweed	Same as proposed action		93.8	1,324	Same as current production		54.6	771
	Pinyon-Juniper			35.9	521			35.9	521
	(Treatment)			(113)	(1,643)				
	Blackbrush			46.3	11			46.3	11
	Sagebrush			65	253			45	174
					2,109				1,477

APPENDIX 3-5 (continued)

		Full Stocking Alternative 1		Stocking by Condition Alternative 2		No Action Alternative 4		Elimination of Grazing Alternative 5	
Allotment	Vegetation Subtype	Air Dry Pounds/Acre	AUMs	Air Dry Pounds/Acre	AUMs	Air Dry Pounds/Acre	AUMs	Air Dry Pounds/Acre	AUMs
Pat's Pond	Grassland	Same as current production		136.6	202	Same as current production		91.2	134
	Annual Forb			29.4	4			22.2	3
					206				137
Penns Well	Grassland	Same as proposed action		153.2	189	Same as current production		102	126
	Pinyon-Juniper			9.6	57			9.6	57
	Annuals			15.3	1			15.3	1
					247				184
Pocum Tank	Sagebrush	Same as proposed action		64.9	683	Same as current production		45.7	480
Poverty	Grassland	Same as proposed action		133.1	6,436	Same as proposed action		89.1	4,308
	Sagebrush			63.5	1,318			36.9	767
	(Treatment)			(94)	(494)				
	Pinyon-Juniper			38.9	943			38.9	943
	(Treatment)			(142)	(705)				
					9,380				6,498
Purgatory Canyon	Desert Shrub	Same as current production -							
	Creosotebush								
Quail Canyon	Pinyon-Juniper	Same as current production		49.8	142	Same as current production		49.8	142
	Desert Shrub			64	293			55.9	256
	Half Shrub			40.7	142			40.7	142
					577				540
Sullivan Canyon	Sagebrush	Same as proposed action		214	62	Same as proposed action		143	41
	Mountain Shrub			108	147			108	147
	Pinyon-Juniper			51.3	635			51.3	635
	(Treatment)			(108)	(420)				
	Creosotebush			39.4	48			39.4	48
	Desert Shrub			32.2	516			25.1	402
					1,399				1,273
Sullivan Tank	Same as current production- -								
Sunshine	Desert Shrub	Same as current production		87.6	1,236	Same as current production		76.4	1,078
	Grassland			144.7	1,128			96.9	755
					2,364				1,833
Shelley	Grassland	Same as current production		107.2	293	Same as current production		71.7	196
Snyder	Grassland	Same as current production		119.7	478	Same as current production		80.3	320
	Sagebrush			71.1	28			50	20
					506				340
Tassi-Black Willow	Desert Shrub	Same as current production -							
Toquer Tank	Grassland	Same as proposed action		147.4	2,301	Same as proposed action		98.2	1,535
Wildcat	Sagebrush	Same as current production		95.9	1,411	Same as current production		95.9	1,411
	(Treatment)	except (94)	(459)	(94)	(459)				
	Grassland			156	717			88.7	406
	Blackbrush			49.4	1,041			49.4	1,041
	(Treatment)	(66.5)	(520)	(66.5)	(520)				
	Mountain Shrub			61.3	394			61.3	394
	Pinyon-Juniper			57.5	3,561			57.5	3,561
	(Treatment)	(37.1)	(790)	(37.1)	(790)				
	Annual Grass			57.7	16			57.7	16
					7,140				6,829
Wolfhole Mountain	Desert Shrub	Same as proposed action		39.3	223	Same as current production		39.3	223
	(Treatment)			(67)	(235)				
	Sagebrush			73.2	260			73.2	260
	(Treatment)			(100)	(90)				
	Pinyon-Juniper			57.6	509			57.6	509
	(Treatment)			(115)	(780)				
					992				992
Wolfhole Canyon	Desert Shrub	Same as current production		40.6	728	Same as current production		40.6	728
	Creosotebush	except		34.5	246			34.5	246
	Annual Grass			61.5	9			56.8	8
	Sagebrush			52.3	918			36.8	646
	(Treatment)	(3,400)	(340)	(80)	(340)				
	Grassland			105.8	589			74.2	413
	Pinyon-Juniper			34.2	326			34.2	326
					2,816				2,367
Whiterock-Soapstone	Same as current production due to pinyon-juniper reinvasion onto land treatment areas - - - - - - - - - - - - - - - - - - -								
Wolfhole Lake	Grassland	Same as current production		121	1,506	Same as current production		81.1	1,010
	(Treatment)	except (139)	(716)	(139)	(716)				
	Sagebrush			103.8	361			73	254
	Annuals			76.9	19			59.9	15
					1,886				1,279
Unallotted	Same as current production- -								
Mine Valley	Creosotebush	Same as current production		16.1	35	Same as current production		16.1	35
	Desert Shrub			52.7	95			46	83
	Grassland			103.9	219			69.5	146
	Sagebrush			44	27			44	27
	Pinyon-Juniper			36.8	40			36.8	40
					416				331
Cedar Pockets	Pinyon-Juniper	Same as current production		36.8	101			36.8	101
	Desert Shrub			69.4	443			54.1	345
	Grassland			107.2	5			71.7	3
					549				449

APPENDIX 3-5 (continued)

Allotment	Vegetation Subtype	Full Stocking Alternative 1		Stocking by Condition Alternative 2		No Action Alternative 4		Elimination of Grazing Alternative 5	
		Air Dry Pounds/Acre	AUMs	Air Dry Pounds/Acre	AUMs	Air Dry Pounds/Acre	AUMs	Air Dry Pounds/Acre	AUMs
Lambing	Desert Shrub	Same as proposed action		50	667	Same as current production		42	560
	Creosotebush			15.5	11			15.5	11
					679				571
Link Spring	Desert Shrub	Same as current production		46.9	1,178	Same as current production		35	882
	Pinyon-Juniper			48.7	408			48.7	408
	Annual Grass			72	108			42	63
					1,694				1,353
Last Chance	Blackbrush	Same as current production - - - - - - - - - - - -							
	Pinyon-Juniper								
Little Tank	Grassland	Same as current production		117	872	Same as proposed action		78	581
Little Wolf	Sagebrush	Same as current production due to natural ecological succession - - - - - - - -							
	Mountain Shrub								
	Pinyon-Juniper								
Littlefield Free Use	Creosotebush	Same as current production		34.4	88	Same as current production		34.4	88
	Desert Shrub			63	61			55	53
					149				141
Littlefield Community	Same as current production- - - - - - - - - - - -								
Lizzard	Desert Shrub	Same as proposed action		64.9	483	Same as current production		50.6	376
	Creosotebush			49.6	401			28.8	233
					884				609
Lower Hurricane	Grassland	Same as current production		105.1	4,650	Same as proposed action		70.3	3,111
	Sagebrush			84.6	48			59.5	34
	Creosotebush			62.5	74			36.4	43
	Desert Shrub			79.9	532			46.5	310
					5,378				3,498
Mainstreet	Grassland	Same as proposed action		130.6	7,442	Same as proposed action		87.3	4,977
	Sagebrush			59.3	3,678			41.8	2,590
	(Treatment)			(93.3)	(490)				
	Pinyon-Juniper			62.5	791			62.5	791
	(Treatment)			(126)	(702)				
	Annuals			20.6	28			16	22
					11,939				8,380
Mesquite Community	Same as current production			Same as proposed action (for annuals only)		Same as proposed action			
Mormon Well	Same as current production due to little or no permanent vegetation change as a result of extreme aridity - - - - - - - - -								
Mt. Trumbull	Same as current production due to juniper retaking chained grasslands; a natural ecological succession - - - - - - - - - -								
Mosby	Same as current production- - - - - - - - - - - -								
Mosby Nay	Annuals	Same as current production		26.5	192	Same as current production		20.6	137
	Creosotebush			31.4	57			31.4	57
	Desert Shrub			21.8	367			21.8	367
	Mountain Shrub			44.2	98			34.4	76
	Half Shrub			20.8	58			20.8	58
					772				695
Unallotted	Same as current production- - - - - - - - - - - -								
Mud and Cane Spring	Mountain Shrub	Same as current production except		116	394	Same as current production		116	394
	Sagebrush			55.2	16			38.8	11
	Pinyon-Juniper			29.3	1,606			29.3	1,606
	(Treatment)	(114)	(594)	(114)	(594)				
	Blackbrush			38.7	627			38.7	627
	(Treatment)	(76.3)	(550)	(76.3)	(550)				
	Grassland			191.6	53			127.9	36
	Annuals			112	3,321			87.3	2,598
					6,017				5,272
Mule Canyon	Desert Shrub	Same as current production		65.9	346	Same as current production		57.5	302
	Half Shrub			13.8	161			13.8	161
					507				463
Mustang Spring	Grassland	Same as current production		82.1	247	Same as current production		56.1	169
	Pinyon-Juniper			47.4	341			47.4	341
	Desert Shrub			71.5	159			62.4	139
					747				649
Pakoon	Same as current production- - - - - - - - - - - -								
Pakoon Spring	Half Shrub	Same as current production		25.8	87	Same as current production		25.8	87
	Creosotebush			9.1	371			9.1	371
	Annuals			34.3	403			31.7	373
	Desert Shrub			30.9	328			30.9	328
	Grassland			96.7	56			65	38
					1,245				1,197
Unallotted	Same as current production- - - - - - - - - - - -								
Parashaunt	Grassland	Same as current production except		410	2,359	Same as proposed action		239	1,373
	Sagebrush			103	111			72.5	78
	Conifer			62.9	352			62.9	352
	Pinyon-Juniper			59.4	3,565			59.4	3,565
	(Treatment)	(137.5)	(1,100)	(137.5)	(1,100)				
	Desert Shrub			50.7	4,603			50.7	4,603
	Half Shrub			50.7	197			50.7	197
					11,187				10,168
Pa's Pocket	Grassland	Same as current production		124.6	67	Same as current production		83.4	45
	Sagebrush			58.4	127			41.1	89
	Creosotebush			31	99			31	99
	Saltbush			47	12			36.6	9
	Snakeweed			41.4	159			30.9	119
					464				361

APPENDIX 3-6

SUMMARY OF KEY SPECIES COMPOSITION REACTION TO GRAZING SYSTEMS

Allotment	Plots	Up	Down	Static	Plots	Up	Down	Static	Plots	Up	Down	Static
Beaver Dam Slope	5		3	2	4	1	3		5	4	1	
Black Rock	4	1	3	1	0				4		1	3
Clay Springs	4	1	3		6	2	3	1				
Duncan Tank	1		1		2		1	1	2	1	1	
Jackson Tank	0				2	1	1	0				
Ivanpah	0				3		3	0				
Little Wolf	2	3			0				1	1		
Little Tank	3	2		1	4	1	2	1	0			
Lower Hurricane	0				7	3	2	2	6	3	2	1
Mainstreet	7	4	3	0	14	5	9	0	6	1	5	
Mt. Trumbull	2	2			4		3	1	1		1	
Poverty	10	2	8		13	8	3	2	3	1	2	
Parashaunt	8	2	5	1	4	3	1					
Sullivan	6	1	4	1	0				2		1	1
Toquer Tank	0				3	2		1	0			
Whiterock-Soapstone	2		2		1		1		1	1		

APPENDIX 3-7

HABITAT ACREAGE BY ALTERNATIVE, GRAZING SYSTEM, AND RANGE CONDITION

PROPOSED ACTION	LESS INTENSIVE					REST ROTATION					DEFERRED SYSTEM				
	Deer	Antelope	Bighorn	Tortoise	Nongame	Deer	Antelope	Bighorn	Tortoise	Nongame	Deer	Antelope	Bighorn	Tortoise	Nongame
Improve to Good	0	0	0	0	5,455	106,215	12,938	3,873	1,422	76,081	32,714	33,919	14,516	589	62,163
Improve to Fair	0	0	0	0	2,896	0	0	0	3,180	42,265	0	1,103	0	0	1,103
Decline to Fair	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Decline to Poor	0	0	0	0	0	0	0	0	0	72,116	0	0	0	0	34,810
Static Good	705	4,494	0	0	22,751	21,828	47,191	1,289	3,025	129,250	991	85,497	0	2,016	120,181
Static Fair	8,116	0	9,677	8,943	39,342	179,217	876	2,170	18,120	293,119	974	2,231	2,130	0	24,601
Static Poor	0	0	323	21,656	30,737	276,411	0	71,461	97,099	561,522	67,488	22,401	190	42,895	173,148
Unsuitable	165	0	1,213	0	1,558	1,076	0	37,366	0	130,807	0	452	8,277	745	16,075
TOTAL	8,986	4,494	11,213	30,599	102,739	584,747	61,005	116,159	122,846	1305,160	102,167	145,603	25,113	46,245	432,081
ALTERNATIVE 1 - FULL STOCKING															
Improve to Good	0	0	0	0	0	86,542	3,400	0	0	7,183	32,714	33,919	10,409	0	52,795
Improve to Fair	0	0	0	0	0	0	0	0	0	0	0	1,103	0	0	1,103
Decline to Fair	0	0	0	0	0	0	0	0	0	7,504	0	0	0	0	0
Decline to Poor	0	0	0	0	0	0	0	0	0	69,150	0	0	0	0	34,810
Static Good	705	4,494	0	0	22,751	21,828	49,876	1,289	3,025	121,746	991	85,497	0	2,016	120,181
Static Fair	8,116	0	9,677	8,943	42,967	198,890	7,729	6,043	19,542	364,279	974	2,231	6,237	589	33,969
Static Poor	0	0	323	21,656	35,463	276,411	0	70,391	100,279	604,491	67,488	22,401	190	42,895	173,148
Unsuitable	165	0	1,213	0	1,558	1,076	0	38,436	0	130,807	0	452	8,277	745	16,075
TOTAL	8,986	4,494	11,213	30,599	102,739	584,747	61,005	116,159	122,846	1305,160	102,167	145,603	25,113	46,245	432,081
ALTERNATIVE 2 - STOCKING BY CONDITION															
Improve to Good	0	0	0	780	6,235	106,215	12,938	3,873	1,422	78,468	32,714	33,919	14,516	589	62,163
Improve to Fair	0	0	0	0	2,896	2,701	0	0	3,180	44,495	0	1,103	0	0	1,103
Decline to Fair	0	0	0	0	0	0	0	0	0	4,602	0	0	0	0	0
Decline to Poor	0	0	0	0	0	0	0	0	0	72,116	0	0	0	0	34,810
Static Good	705	4,494	0	0	22,751	21,828	47,191	1,289	3,025	124,648	991	85,497	0	2,016	120,181
Static Fair	8,116	0	9,677	8,163	38,562	179,217	876	2,170	18,120	291,203	974	2,231	2,130	0	24,601
Static Poor	0	0	323	21,656	30,737	273,710	0	70,391	97,099	558,821	67,488	22,401	190	42,895	173,148
Unsuitable	165	0	1,213	0	1,558	1,076	0	38,436	0	130,807	0	452	8,277	745	16,075
TOTAL	8,986	4,494	11,213	30,599	102,739	584,747	61,005	116,159	122,846	1305,160	102,167	145,603	25,113	46,245	432,081
ALTERNATIVE 3 - NO LAND TREATMENT															
Improve to Good	0	0	0	0	5,455	9,081	9,538	3,079	1,422	76,081	3,104	32,919	7,211	589	62,163
Improve to Fair	0	0	0	0	2,896	0	0	0	3,180	42,265	0	1,103	0	0	1,103
Decline to Fair	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Decline to Poor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Static Good	705	4,494	0	0	22,751	21,092	47,191	1,289	3,025	129,250	991	85,497	0	2,016	120,181
Static Fair	8,116	0	9,677	8,943	39,342	213,130	4,276	2,964	18,120	331,915	974	3,231	2,130	0	25,601
Static Poor	0	0	323	21,656	30,737	330,368	0	70,391	97,099	594,842	97,098	22,401	7,495	42,895	206,958
Unsuitable	165	0	1,213	0	1,558	1,076	0	38,436	0	130,807	0	452	8,277	745	16,075
TOTAL	8,986	4,494	11,213	30,599	102,739	584,747	61,005	116,159	122,846	1305,160	102,167	145,603	25,113	46,245	432,081
ALTERNATIVE 4 - NO ACTION	LESS INTENSIVE					AMP									
Improve to Good	0	0	0	0	11,220	27,144	27,420	358	0	30,570					
Improve to Fair	0	0	0	0	0	0	1,103	0	0	1,103					
Decline to Fair	0	0	0	0	0	0	0	0	0	0					
Decline to Poor	0	0	0	0	0	0	0	0	0	28,410					
Static Good	20,369	17,780	0	5,041	73,303	3,155	119,402	1,289	0	190,098					
Static Fair	209,387	19,315	22,588	29,074	357,750	51,206	0	2,120	0	111,106					
Static Poor	324,764	8,963	54,848	130,603	701,295	103,025	15,668	14,486	34,227	184,516					
Unsuitable	1,235	0	24,001	745	60,387	6	452	14,720	0	87,973					
TOTAL	555,755	46,058	101,437	165,463	1203,955	184,536	164,045	32,973	34,227	633,776					

ALTERNATIVE 5 - ELIMINATION Same as Alternative 3

APPENDIX 3-8
SPECIES COMPOSITION

Allotment	Vegetation Subtype	Current Key Species Composition		Proposed Action Alternative 3 Future Key Species Composition		Full Stocking		Stocking by Condition		No Action		Elimination	
		Grass	Shrub	Grass	Shrub	Grass	Shrub	Grass	Shrub	Grass	Shrub	Grass	Shrub
Beaver Dam Slope	Desert Shrub	6	8	6	8	6	8	6	8	6	8	6	8
	Creosotebush	1	1	1	1	1	1	1	1	1	1	1	1
Belnap West	Grassland	39	2	54	2	39	2	54	2	39	2	51	2
	Sagebrush/Grassland	32	2	47	2	32	2	47	2	32	2	44	2
	Sagebrush	10	5	10	20	10	5	10	2	10	5	9	5
Belnap East	Grassland	50	3	55	3	50	3	67	4	53	3	52	3
	Sagebrush	20	10	25	20	20	10	27	23	20	10	23	19
	(Treatment)	(20)	(10)	(40)	(20)	(40)	(20)	(40)	(20)	-	-	-	-
Black Rock	Grassland	24	8	39	13	24	8	39	13	39	13	37	14
	Sagebrush	27	T	37	T	27	T	37	T	37	T	35	T
	Mountain Shrub	5	30	5	35	5	30	5	35	5	35	5	33
	Conifer	5	T	5	T	5	T	5	T	5	T	5	T
	Pinyon-Juniper	T	15	T	15	T	15	T	15	T	15	T	15
	(Treatment)	-	-	(40)	(20)	(40)	(20)	(40)	(20)	-	-	-	-
	Creosotebush	5	35	5	35	5	35	5	35	5	35	5	33
	Desert Shrub	T	30	T	30	T	30	T	30	T	30	T	28
	(Treatment)	-	-	(40)	(20)	(40)	(20)	(40)	(20)	-	-	-	-
Blake Pond	Desert Shrub	30	5	45	10	45	10	45	10	30	5	42	9
	(Treatment)			(40)	(20)	(40)	(20)	(40)	(20)	-	-	-	-
	Sagebrush	40	0	55	5	55	5	55	5	40	0	52	5
	Snakeweed	40	0	55	5	55	5	55	5	40	0	52	5
	Juniper	35	T	35	T	35	T	35	T	35	T	33	T
	Creosotebush	7	19	7	19	7	19	7	19	7	19	7	18
	Shadscale	T	9	T	9	T	9	T	9	T	9	T	9
Cedar Wash	Desert Shrub	10	20	15	30	10	20	15	30	10	20	14	28
Clay Springs	Pinyon-Juniper	10	10	10	10	10	10	10	10	10	10	10	10
	Desert Shrub	10	5	10	5	10	5	10	5	10	5	10	5
	Grassland	70	5	70	5	70	5	93	7	70	5	65	5
	Annuals	40	5	55	5	40	5	55	5	55	5	51	5
Cottonwood	Pinyon-Juniper	8	8	8	8	8	8	8	8	8	8	8	8
	(Treatment)	(8)	(8)	(40)	(20)	(40)	(20)	(40)	(20)	-	-	-	-
	Desert Shrub	12	3	12	3	12	3	12	3	12	3	12	3
	Grassland	5	25	10	30	5	25	10	30	5	25	9	28
	Snakeweed	7	13	10	18	7	13	10	18	7	13	10	17
	Annuals	8	6	18	16	8	6	18	16	8	6	17	15
	Sagebrush	10	3	10	3	10	3	10	3	10	3	10	3
Diamond Butte North	Grassland	63	8	68	8	63	8	68	8	63	8	64	8
Diamond Butte South	Grassland	25	38	30	43	25	38	33	50	25	38	28	40
Rosenberry	Grassland	65	15	70	15	65	15	87	17	65	15	64	14
Iverson	Grassland	60	10	65	10	60	10	80	13	60	10	61	9
Dripping Spring	Desert Shrub	5	5	5	5	5	5	5	5	5	5	5	5
Duncan Tank	Grassland	43	12	53	12	43	12	58	16	53	12	50	11
	Pinyon-Juniper	50	T	50	T	50	T	67	T	50	T	47	T
	Desert Shrub	36	26	36	36	36	26	48	35	36	36	34	34
Grassie Mountain	Pinyon-Juniper	8	12	8	12	8	12	8	12	8	12	8	12
	(Treatment)	(8)	(12)	(35)	(24)	(35)	(24)	(35)	(24)	-	-	-	-
	Sagebrush	23	5	28	10	23	5	31	7	23	5	26	9
	(Treatment)	(23)	(5)	(50)	(10)	(50)	(10)	(50)	(10)	-	-	-	-
	Blackbrush	6	17	6	17	6	17	6	17	6	17	6	17
Hidden Sullivan	Juniper	13	4	13	4	13	4	13	4	13	4	13	4
	Sagebrush	8	3	8	3	8	3	8	3	8	3	8	3
	Desert Shrub	7	7	7	7	7	7	7	7	7	7	7	7
	Blackbrush	6	11	6	11	6	11	6	11	6	11	6	11
	Shortgrass	30	15	45	15	30	15	45	15	30	15	28	14
Highway	Creosotebush	5	T	10	T	5	T	10	T	5	T	9	T
	Desert Shrub	15	25	20	30	15	25	20	33	15	25	19	31
Home Ranch	Pinyon-Juniper	4	9	4	9	4	9	4	9	4	9	4	9
	Sagebrush	7	T	7	T	7	T	7	T	7	T	7	T
	Blackbrush	10	T	10	T	10	T	10	T	10	T	10	T
Ivanpab	Pinyon-Juniper	30	T	30	T	30	T	30	T	30	T	30	T
	Sagebrush	30	T	40	T	30	T	40	T	40	T	38	T
	Grassland	55	0	65	0	55	0	73	0	65	T	61	T
Jackson Tank	Grassland	60	13	70	13	70	13	80	17	70	13	66	12

APPENDIX 3-8 (continued)

Allotment	Vegetation Subtype	Current Key Species Composition		Proposed Action Alternative 3 Future Key Species Composition		Full Stocking		Stocking by Condition		No Action		Elimination	
		Grass	Shrub	Grass	Shrub	Grass	Shrub	Grass	Shrub	Grass	Shrub	Grass	Shrub
Jump Canyon	Snakeweed	2	6	2	6	2	6	2	6	2	6	2	6
	Pinyon-Juniper	5	15	5	15	5	15	5	15	5	15	5	15
	(Treatment)	(5)	(15)	(30)	(30)	(30)	(30)	(30)	(30)	-	-	-	-
	Blackbrush	0	5	0	5	0	5	0	5	0	5	0	5
	Sagebrush	30	T	40	5	30	T	40	5	30	T	38	5
Lambing	Desert Shrub	T	24	T	30	T	30	T	32	T	24	T	28
	Creosotebush	6	6	6	6	6	6	6	6	6	6	6	6
Link Spring	Desert Shrub	3	8	3	8	3	8	3	8	3	8	3	8
	Pinyon-Juniper	6	22	6	22	6	22	6	30	6	22	6	20
	Annuals	5	5	25	15	5	5	25	15	5	5	23	14
Last Chance	Blackbrush	T	6	T	6	T	6	T	6	T	6	T	6
	Pinyon-Juniper	T	15	T	15	T	15	T	15	T	15	T	15
Littlefield Free Use	Creosotebush	T	T	T	T	T	T	T	T	T	T	T	T
	Desert Shrub	28	11	28	11	28	11	37	14	28	11	28	11
Littlefield Community	Desert Shrub	T	5	T	5	T	5	T	5	T	5	T	5
	Creosotebush	T	T	T	T	T	T	T	T	T	T	T	T
	Mountain Shrub	8	34	8	49	8	34	8	49	8	34	8	32
	Pinyon-Juniper	T	15	T	15	T	15	T	15	T	15	T	15
	Conifer	T	15	T	15	T	40	T	53	T	40	T	40
	Sagebrush	10	T	10	T	10	T	10	T	10	T	10	T
Little Tank	Grassland	43	14	53	14	43	14	58	20	53	14	50	13
Little Wolf	Pinyon-Juniper	T	T	T	T	T	T	T	T	T	T	T	T
	Mountain Shrub	T	18	T	18	T	18	T	24	T	18	T	17
	Sagebrush	14	17	20	20	14	17	19	25	20	20	19	19
Lizzard	Desert Shrub	20	27	25	33	25	33	27	36	20	27	23	32
	Creosotebush	T	50	T	50	T	50	T	67	T	50	T	47
Lower Hurricane	Desert Shrub	31	22	41	32	31	22	41	32	41	32	38	30
	Creosotebush	35	5	45	10	35	5	47	10	45	10	33	9
	Grassland	40	15	55	15	40	15	55	15	55	15	52	14
	Sagebrush	45	T	50	T	45	T	60	T	50	T	48	T
Mainstreet	Grassland	49	2	55	5	55	5	66	2	55	5	52	5
	Sagebrush	17	5	23	10	23	10	23	10	23	10	21	8
	(Treatment)	(17)	(5)	(55)	(5)	(55)	(5)	(55)	(5)	-	-	-	-
	Pinyon-Juniper	23	10	23	10	23	10	23	10	23	10	23	10
	(Treatment)	(23)	(10)	(30)	(30)	(30)	(30)	(30)	(30)	-	-	-	-
	Annuals	5	T	20	5	20	5	20	5	20	5	18	5
Mesquite Community	Desert Shrub	T	4	T	4	T	4	T	4	T	4	T	4
	Snakeweed	2	5	2	5	2	5	2	5	2	5	2	5
	Mountain Shrub	T	34	T	34	T	34	T	34	T	34	T	34
	Pinyon-Juniper	T	10	T	10	T	10	T	10	T	10	T	10
	Annuals	5	15	20	15	5	15	20	15	5	15	18	14
Mormon Well	Desert Shrub	10	6	10	6	10	6	13	8	10	6	10	6
	Creosotebush	T	13	T	13	T	13	T	13	T	13	T	13
Mt. Trumbull	Grassland	77	2	77	2	77	2	77	2	77	2	77	2
	Sagebrush	32	0	37	5	32	0	42	0	32	0	35	4
	Pinyon-Juniper	17	3	17	3	17	3	17	3	17	3	17	3
	Annuals	0	0	10	5	0	0	10	5	0	0	9	4
Mosby	Desert Shrub	T	5	T	5	T	5	T	5	T	5	T	5
	Blackbrush	T	6	T	6	T	6	T	6	T	6	T	6
Mosby-Nay	Annuals	T	13	5	18	T	13	5	18	T	13	T	13
	Creosotebush	T	13	T	13	T	13	T	13	T	13	T	13
	Blackbrush	T	10	T	10	T	10	T	10	T	10	T	10
	Desert Shrub	T	13	T	13	T	13	T	13	T	13	T	13
	Mountain Shrub	T	20	T	25	T	20	T	27	T	20	T	23
	Half Shrub	T	24	T	29	T	24	T	32	T	24	T	27
Unallotted	Desert Shrub	5	17	5	17	- - - - - - - - Same as current condition - - - - - - - - - - -							
	Half Shrub	T	33	T	33	- - - - - - - - Same as current condition - - - - - - - - - - -							
Mud and Cane Spring	Mountain Shrub	T	45	T	50	T	45	T	60	T	45	T	47
	Pinyon-Juniper	4	16	4	16	4	16	4	16	4	16	4	16
	(Treatment)	(4)	(16)	(30)	(30)	(30)	(30)	(30)	(30)	-	-	-	-
	Blackbrush	T	5	T	5	T	5	T	5	T	5	T	5
	Sagebrush	5	15	15	20	5	15	7	20	5	15	5	19
	Grassland	55	20	70	20	55	20	74	26	55	20	64	18
	Annuals	27	15	33	20	27	15	36	20	27	15	32	18
Mule Canyon	Desert Shrub	22	10	32	20	22	10	29	13	22	10	30	19
	Half Shrub	5	5	5	5	5	5	5	5	5	5	5	5

APPENDIX 3-8 (continued)

Allotment	Vegetation Subtype	Current Key Species Composition		Proposed Action Alternative 3 Future Key Species Composition		Full Stocking		Stocking by Condition		No Action		Elimination	
		Grass	Shrub	Grass	Shrub	Grass	Shrub	Grass	Shrub	Grass	Shrub	Grass	Shrub
Mustang Spring	Grassland	20	25	20	35	20	25	27	35	20	25	18	32
	Desert Shrub	15	15	20	20	15	15	20	20	15	15	14	14
	Pinyon-Juniper	10	20	10	20	10	20	10	20	10	20	10	20
Pakoon	Creosotebush	T	27	T	32	T	27	T	38	T	27	T	30
	Desert Shrub	8	6	8	6	8	6	8	6	8	6	8	6
Pakoon Spring	Half Shrub	4	30	4	35	4	30	4	40	4	30	4	32
	Creosotebush	T	20	T	25	T	20	T	27	T	20	T	23
	Annuals	T	7	T	17	T	17	T	18	T	7	T	17
	Desert Shrub	3	21	3	25	3	21	3	28	3	21	3	20
	Blackbrush	4	10	4	10	4	10	4	10	4	10	4	10
	Grassland	35	18	40	18	35	18	47	24	35	18	38	16
Unallotted	Annuals	T	T	T	T	- - - - - - - - Same as current species composition - - - - - -							
	Desert Shrub	5	10	5	10	- - - - - - - - Same as current species composition - - - - - -							
Parashaunt	Conifer	15	T	15	T	15	T	15	T	15	T	15	T
	Pinyon-Juniper	8	7	8	7	8	7	8	7	8	7	8	7
	(Treatment)	(8)	(7)	(30)	(30)	(30)	(30)	(30)	(30)	-	-	-	-
	Sagebrush	10	7	10	7	10	7	10	7	10	7	10	7
	Blackbrush	13	8	13	8	13	8	13	8	13	8	13	8
	Grassland	83	3	85	3	85	3	85	3	85	3	85	3
	Half Shrub	T	20	T	25	T	20	T	27	T	20	T	22
Pa's Pocket	Grassland	55	16	70	16	55	16	73	21	55	16	64	15
	Sagebrush	29	12	35	17	29	12	39	16	29	12	33	16
	Creosotebush	2	22	2	22	2	22	2	30	2	22	2	22
	Blackbrush	6	24	6	24	6	24	6	24	6	24	6	24
	Half Shrub	12	13	17	18	12	13	16	17	12	13	16	17
Pat's Pond	Grassland	42	14	47	14	42	14	56	19	42	14	44	13
	Annual Forb	T	15	5	20	T	15	T	20	T	15	5	19
Penns Well	Grassland	52	T	62	T	62	T	70	T	52	T	58	T
	Annual Forb	T	T	T	T	T	T	T	T	T	T	T	T
	Pinyon-Juniper	5	5	5	5	5	5	5	5	5	5	5	5
Pocum Tank	Sagebrush	20	17	22	20	22	20	27	23	20	17	20	18
Poverty	Grassland	61	13	71	13	71	13	82	13	71	13	65	13
	Sagebrush	15	6	20	6	20	6	20	6	20	6	18	6
	(Treatment)	(15)	(6)	(50)	(10)	(50)	(10)	(50)	(10)	-	-	-	-
	Juniper	8	6	8	6	8	6	8	6	8	6	8	6
	(Treatment)	(8)	(6)	(40)	(20)	(40)	(20)	(40)	(20)	-	-	-	-
	Species data from watershed writeups												
Purgatory Canyon	Desert Shrub	5	15	10	15	5	15	7	20	5	15	9	14
	Creosotebush	5	20	10	20	5	20	7	27	5	20	9	19
Quail Canyon	Pinyon-Juniper	8	22	8	22	8	22	8	22	8	22	8	22
	Desert Shrub	T	29	T	34	T	29	T	39	T	29	T	32
	Half Shrub	16	11	21	16	16	11	21	11	16	11	19	15
Sullivan Canyon	Sagebrush	40	6	45	11	40	6	54	6	45	11	42	10
	Mountain Shrub	T	40	T	50	T	40	T	54	T	50	T	48
	Pinyon-Juniper	9	14	9	14	9	14	9	19	9	14	9	13
	(Treatment)	(9)	(14)	(45)	(15)	(45)	(15)	(45)	(15)	-	-	-	-
	Creosotebush	5	30	5	30	5	30	5	40	5	30	5	28
	Desert Shrub	7	8	7	8	7	8	7	8	7	8	7	8
Sullivan Tank	Sagebrush	15	5	15	10	15	5	20	5	15	5	14	9
	Juniper	5	5	5	5	5	5	5	5	5	5	5	5
Sunshine	Desert Shrub	11	14	16	20	11	14	15	19	11	14	15	19
	Grassland	45	16	50	16	45	16	60	21	45	16	47	15
Tassi-Black Willow	Desert Shrub	T	7	T	7	T	7	T	7	T	7	T	7
Toquer Tank	Grassland	53	14	68	14	68	14	68	14	68	14	64	14
Whiterock-Soapstone	Grassland	44	2	29	17	29	17	29	17	29	17	31	16
	Pinyon-Juniper	5	3	5	3	5	3	5	3	5	3	5	3
	Sagebrush	15	T	20	T	20	T	20	T	20	T	17	T
	Species data from watershed writeups												
Wildcat	Sagebrush	33	15	38	15	33	15	44	15	33	15	36	14
	(Treatment)	(33)	(15)	(50)	(10)	(50)	(10)	(50)	(10)	-	-	-	-
	Grassland	57	12	63	12	57	12	76	12	57	12	60	11
	Blackbrush	3	13	3	13	3	13	3	13	3	13	3	13
	(Treatment)			(40)	(20)	(40)	(20)	(40)	(20)	-	-	-	-
	Mountain Shrub	5	40	5	45	5	40	5	53	5	40	-	-
	Pinyon-Juniper	19	9	19	9	2	23	2	23	2	23	2	23
	(Treatment)	(19)	(9)	(35)	(25)	(40)	(20)	(40)	(20)	-	-	-	-
	Annual Grass	T	T	5	5	5	T	10	5	5	T	5	T

APPENDIX 3-8 (continued)

		Current Key Species Composition		Proposed Action Alternative 3 Future Key Species Composition		Full Stocking		Stocking by Condition		No Action		Elimination	
Allotment	Vegetation Subtype	Grass	Shrub	Grass	Shrub	Grass	Shrub	Grass	Shrub	Grass	Shrub	Grass	Shrub
Wolfhole Mountain	Blackbrush	T	14	T	14	T	14	T	20	T	14	T	14
	(Treatment)			(40)	(20)	(40)	(20)	(40)	(20)	-	-	-	-
	Desert Shrub	8	6	8	6	8	6	8	6	8	6	8	6
	Sagebrush	4	11	4	11	4	11	4	11	4	11	4	11
	(Treatment)	(4)	(11)	(35)	(25)	(35)	(25)	(35)	(25)	-	-	-	-
	Pinyon-Juniper	2	23	2	23	2	23	2	23	2	23	2	23
	(Treatment)	(2)	(23)	(40)	(20)	(40)	(20)	(40)	(20)	-	-	-	-
Wolfhole Lake	Grassland	35	12	40	12	35	12	47	12	35	12	38	12
	Sagebrush	35	0	45	0	35	0	47	0	35	0	42	0
	(Treatment)	(35)	(0)	(50)	(0)	(35)	(25)	(35)	(25)	-	-	-	-
	Annuals	5	T	10	5	5	T	10	5	5	T	9	5
Wolfhole Canyon	Desert Shrub	10	18	15	23	15	23	10	24	10	18	14	21
	Creosotebush	9	22	9	22	9	22	9	29	9	22	9	20
	Annual Grass	20	T	25	T	25	T	25	T	20	T	23	T
	Sagebrush	20	5	25	10	25	10	25	10	20	5	23	T
	(Treatment)	(20)	(5)	(40)	(20)	(40)	(10)	(40)	(10)	-	-	-	-
	Grassland	44	11	60	11	60	11	59	11	44	11	56	11
	Pinyon-Juniper	16	T	16	T	16	T	16	T	16	T	16	T
Mine Valley	Creosotebush	T	5	T	5	T	5	T	5	T	5	T	5
	Desert Shrub	10	20	15	25	10	20	15	27	10	20	14	23
	Blackbrush	T	15	T	15	T	15	T	15	T	15	T	15
	Grassland	55	10	70	10	55	10	74	10	55	10	64	10
	Sagebrush	5	10	5	10	5	10	5	10	5	10	5	10
	Pinyon-Juniper	T	5	T	5	T	5	T	5	T	5	T	5
Cedar Pockets	Pinyon-Juniper	T	5	T	5	T	5	T	5	T	5	T	5
	Desert Shrub	10	20	15	25	10	20	13	27	10	20	12	23
	Joshua Tree	10	15	15	25	10	15	10	20	10	15	13	23
	Grassland	55	10	70	10	55	10	74	10	55	10	64	9
Shelly	Grassland	42	16	52	21	42	16	57	16	42	16	49	20
Snyder	Grassland	53	3	68	3	53	3	71	3	53	3	64	3
	Sagebrush	31	T	41	T	31	T	41	T	31	T	39	T
Unallotted	Desert Shrub	5	10	5	10	- - - - - - - - Same as current species composition - - - - - -							

GLOSSARY

GLOSSARY

ABBREVIATIONS

The following abbreviations are used frequently in this statement. Those representing terms will be defined under respective entries in the glossary.

AG&FD	Arizona Game and Fish Department
AMP	allotment management plan
AU	animal unit
AUM	animal unit month
BLM	Bureau of Land Management
CCD	census county division
CFR	Code of Federal Regulations
EAR	environmental assessment record
EIS	environmental impact statement
ES	environmental statement
FLPMA	Federal Land Policy and Management Act of 1976
FTEE	full-time employment equivalent
HMP	habitat management plan
MFP	management framework plan
NPS	National Park Service
NRA	National Recreation Area
ORV	off-road vehicle
SCS	Soil Conservation Service
SEDS	BLM Socioeconomic Data System
SEP	social-economic profile
SEPA	social-economic profile area
SSF	soil surface factor
TDS	total dissolved solids
URA	unit resource analysis
VRM	visual resource management
WC&DI	Watershed Conservation and Development Inventory

TERMS

ACRE-FOOT. A volume that will cover an area of 1 acre to a depth of 1 foot (43,560 cubic feet).

ACTIVE (GRAZING) USE. The number of AUMs paid for and used by a livestock operator on public lands. Active use and nonuse equal grazing preference.

ALLOTMENT. An area of land where one or more operators graze their livestock. It generally consists of public lands but may include parcels of private or State-owned lands. The number of livestock and season of use are stipulated for each allotment. An allotment may consist of one or several pastures.

ALLOTMENT MANAGEMENT PLAN (AMP). A livestock grazing management plan dealing with a specific unit of rangeland, based on multiple-use resource management objectives. The AMP considers livestock grazing in relation to other uses of the range and in relation to renewable resources—watershed, vegetation, and wildlife. An AMP establishes the seasons of use, the number of livestock to be permitted on the range, and the range improvements needed.

ANASAZI. Prehistoric Indians who inhabited Northern Arizona from approximately 500-1300 A.D.

ANIMAL UNIT (AU). Considered to be one mature (1,000 pound) cow or the equivalent, based upon average daily forage consumption of 26 pounds dry matter per day (Range Term Glossary Committee, 1974).

ANIMAL UNIT MONTH (AUM). The amount of forage necessary for the sustenance of one cow or its equivalent for a period of 1 month.

ANNUAL PLANT. A plant that completes its life cycle and dies in 1 year or less (Range Term Glossary Committee, 1974).

AQUIFER. A water-bearing bed or layer of permeable rock, sand, or gravel capable of yielding considerable amounts of water.

BASAL AREA. The area of ground surface covered by the stem or stems of a range plant, usually measured 1 inch above the soil.

BASE HERD. Constant herd size that is continually licensed; it may or may not be the same as the carrying capacity.

BIOMASS. The total weight of the living organisms in some biological system.

BROOD COW. A cow used for breeding.

BROWSE. The tender shoots, twigs, and leaves of trees and shrubs often used as food by cattle, deer, elk and other animals; or to feed or eat on browse.

CALF CROP. The number of calves weaned from a given number of cows bred, usually expressed as a percentage (Range Term Glossary Committee, 1974).

CANOPY. The vertical projection downward of the aerial portion of shrubs and trees, usually expressed as percent of ground so occupied.

CARRYING CAPACITY (GRAZING CAPACITY). The maximum stocking rate possible without damage to vegetation or related resources. It may vary from year to year in the same area because of fluctuating forage production (Range Terms Glossary Committee, 1974).

CENSUS COUNTY DIVISION (CCD). County division used by the U.S. Bureau of the Census for enumerating some census data.

CHANNEL EROSION. Erosion occurring in the bottom of gullies that are more than 1 foot deep.

CIST. A burial chamber typically lined with stone.

CLIMAX. The highest ecological development of a plant community capable of perpetuation under the prevailing climate and soil conditions.

COOL-SEASON PLANT. A plant whose major growth period occurs during the winter and early spring. See warm-season plant.

COW-CALF LIVESTOCK OPERATION. A livestock operation in which a base breeding herd of mother cows and bulls is maintained. The cows produce a calf crop each year, and the operation keeps some heifer calves from each calf crop for breeding herd replacements. The operation sells the rest of the calf crop between the ages of 6 and 12 months along with old or nonproductive cows and bulls.

CRUCIAL (CRITICAL) WILDLIFE HABITAT. That part of the habitat of a wildlife species that is essential to the survival and perpetuation of the species, either as individuals or as a population.

CULL COW WEIGHT. Weight of a cow when removed from a livestock operation.

CULTURAL RESOURCE DATA BASE: The totality of information sources that can be used to understand past human activities. This base includes not only cultural remains such as artifacts, structures, features and activity areas, but any parts of the natural and cultural environments that were either used or modified by people in the past or that can aid in understanding the basic relationship between people and the environment in the past.

DEFERRED ROTATION GRAZING. Moving grazing animals to various parts of a range in succeeding years or seasons to provide for seed production, plant vigor, and seedling growth.

DISCHARGE. The volume of water flowing past a point per unit time, commonly expressed as cubic feet per second, million gallons per minute, or cubic meters per second (Soil Conservation Society of America, 1970).

DOMINANT SPECIES. A plant species that dominates the general view of an area or appears to be the dominant species in an area and thus determines the vegetation subtype into which an area is classed.

DOUBLE CHAINING. A method by which an anchor chain is dragged across the same area twice (the second dragging normally in the opposite direction from the first), resulting in a more effective kill of target plants than a single chaining.

DRAINAGE, NATURAL. A soil condition referring to the frequency and duration of periods when the soil is free of saturation or partial saturation. Two drainage classes are recognized in this EIS:

WELL-DRAINED—water is removed from the soil readily but not rapidly. These soils are normally medium textured, but finer or coarser-textured soils may also fall in this class.

MODERATELY WELL-DRAINED—water is removed from the soil slowly so that the profile is wet for a small but significant part of the time. These soils commonly have a slowly permeable layer within or immediately underneath the solum.

DRIVEWAY. A strip of land specifically designated for the controlled movement of livestock (Range Term Glossary Committee, 1974).

ECOSYSTEM. A complex self-sustaining natural system that includes living and nonliving components of the environment and the interactions that bind them together. Its functioning involves the circulation of matter and energy between organisms and their environment.

ECOTONE. A transition line or strip of vegetation between two communities, having characteristics of both kinds of neighboring vegetation as well as characteristics of its own (Soil Conservation Society of America, 1970).

EFFECTIVE ROOT DEPTH. The depth to which the major portion of roots of the most common forage species penetrate the soil.

ENDANGERED SPECIES. Any species in danger of extinction throughout all or a significant portion of its range. This definition excludes species of insects that the Secretary of Interior determines to be pests and whose protection under the Endangered Species Act of 1973 would present an overwhelming and overriding risk to man.

ENVIRONMENT. The surrounding conditions, influences, or forces that affect or modify an organism or an ecological community and ultimately determine its form and survival.

ENVIRONMENTAL ASSESSMENT RECORD (EAR). The procedure and format for recording environmental analysis (the systematic process of considering environmental factors in land management actions).

EVAPOTRANSPIRATION. The loss of water by transpiration from plants and evaporation from the soil.

EPHEMERAL RANGE. Range that does not consistently produce forage, but periodically provides annual vegetation suitable for livestock grazing.

EPHEMERAL STREAMS. Streams flowing during rainstorms or peak snowmelt. Channels are poorly defined, and flow usually lasts less than 10 percent of the year.

EROSION. The wearing away of the land surface by wind, water, and other geological agents.

EXCLOSURE. A small area set aside and protected from grazing either to preserve representative areas in excellent range condition or to allow observation of succession on depleted rangeland without grazing (Rangeland Reference Area Committee, 1975).

FAMILY LIVESTOCK OPERATION. An operation owned by adult members of a family (often maintaining separate households) who share expenses and responsibilities but have not legally incorporated. Family operations that incorporate are considered corporation owned rather than family owned.

FEDERAL LANDS. In this statement, public lands administered by the Bureau of Land Management and lands in Lake Mead National Recreation Area that are administered by the National Park Service but on which BLM administers grazing.

FOOD WEB. The total complex pattern of feeding relations of an independent, self-maintaining, major biotic community.

FORAGE. All browse and herbaceous foods available to grazing animals, which may be grazed or harvested for feeding; the act of consuming forage (Range Term Glossary Committee, 1974).

FORB. A herbaceous plant that is not a grass, sedge, or rush (Soil Conservation Society of America, 1970).

FULL-TIME EMPLOYMENT EQUIVALENT (FTEE): An estimate of the work that could be accomplished by one full-time employee for a 1-year period, regardless of the number of part-time employees who might actually do the work.

GRAZING CAPACITY. See carrying capacity.

GRAZING PREFERENCE (QUALIFICATIONS). The total number of AUMs of livestock grazing on public lands apportioned and attached to base property owned or controlled by a permittee or lessee.

HABITAT. A specific set of physical conditions that surround the single species, a group of species, or a large community. In wildlife management, the major components of habitat are considered to be food, water, cover, and living space.

HABITAT MANAGEMENT PLAN (HMP). A written and officially approved plan for a specific geographical area of public land that identifies wildlife habitat and related objectives, establishes the sequence of actions for achieving objectives, and outlines procedures for evaluating accomplishments.

HALF-SHRUB. A perennial plant with a woody base whose annually produced stems die each year (Range Term Glossary Committee, 1974).

HEDGING. The persistent browsing of terminal buds of browse species causing excessive lateral branching and a reduction in upward growth (Range Term Glossary Committee, 1974).

HERBACEOUS. Pertaining to plants having little or no woody tissue.

HERBAGE. Herbaceous vegetation (as grass), especially when used for grazing.

INFILTRATION. The movement of water into soil through pores or other openings.

INTENSIVE LIVESTOCK GRAZING MANAGEMENT. A livestock management program that is based on the multiple-use resource management concept and that implements a specified grazing system formulated in an allotment management plan.

INTRUSION (VISUAL RESOURCES). A feature (land, vegetation, or structure) that is generally considered out of context with the characteristic landscape.

KEY AREAS. Areas of pastures representing various vegetation communities and used as sites for evaluation studies to monitor range condition and trend.

KEY SPECIES. A plant that is relatively or potentially abundant, that is able to endure moderately close grazing, and that serves as an indicator of changes occurring in a vegetational complex. The key species is an important vegetation component, which, if overused, will significanty affect watershed conditions, grazing capacity, or other resources. More than one key species may be selected on an allotment. One species may be important for watershed protection and a different species important for livestock or wildlife forage or other values.

LESS INTENSIVE MANAGEMENT. A limited form of range management employed when the percentage of public land is small; when public land is scheduled to be tranferred from public ownership; or when other conditions are not conducive to intensive management. Under less intensive management, an allottee is not required to follow a specified grazing system, but BLM specifies livestock numbers, class of animal, and grazing season.

LITHIC. A stone or rock that may be either abraded into the proper form for use as a tool or shaped by knocking pieces off.

LITTER. A surface layer of loose organic debris, consisting of freshly fallen or slightly decomposed organic materials (Soil Conservation Society of America, 1970).

LIVESTOCK OPERATOR. In this EIS, an individual, family, corporation, or other entity that runs a livestock operation. An operator may have a single allotment, more than one allotment, or a portion of an allotment.

LIVESTOCK PERFORMANCE. The efficiency of livestock within an operation, as measured by such indicators as percent calf crop, weaned calf weights, animal death rates, and cull cow weights.

LIVESTOCK PRODUCTION. The weight and number of animals that a particular range, pasture, or management system produces (Range Term Glossary Committee, 1974).

MANAGEMENT FRAMEWORK PLAN (MFP). A land use plan for public lands that provides a set of goals, objectives, and constraints for a specific planning area to guide the development of detailed plans for the management of each resource.

MOENKOPIE BADLANDS. Highly eroded shales, siltstones, and sandstones of the Moenkopie geologic formation, which support little vegetation and have little potential for vegetation improvement.

MULTIPLIER (INCOME). A number that, when multiplied by $1.00, indicates the total change in personal income resulting from a one dollar change in income to a particular sector. With a multiplier of 1.226, one dollar in livestock income would create $1.226 as the first dollar is exchanged secondarily.

NATIONAL REGISTER OF HISTORIC PLACES. A register of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, and culture, maintained by the Secretary of the Interior.

NATURAL AREA. Lands managed for retention of their typical or unusual plant or animal types, associations, or other biotic phenomena; or their outstanding scenic, geologic, pedologic, or aquatic features or processes.

NICHE. The place in the plant or animal community that a species may occupy (Soil Conservation Society of America, 1970).

OFF-ROAD VEHICLE (ORV). Any motorized vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, marsh, swampland or other natural terrain, excluding (a) any registered motorboat, (b) any fire, military, emergency, or law enforcement vehicle when used for emergencies and any combat or combat support vehicle when used for national defense, and (c) any vehicle whose use is expressly authorized by the respective agency head under a permit, lease, license, or contract.

OPERATOR. See livestock operator.

PASTURE. A grazing area enclosed and separated from other areas by fences or natural barriers.

PERENNIAL PLANT. A plant that has a life cycle of 3 or more years (Range Term Glossary Committee, 1974).

PHASE I WATERSHED STUDIES. See Watershed Conservation and Development System.

PHENOLOGY (PHENOLOGIES). The study of periodic biological phenomena, such as flowering or seeding, especially as related to climate (Range Term Glossary Committee, 1974).

PHREATOPHYTE. A plant that draws its water supply from ground water.

PIONEER PLANT. A plant able to establish itself in bare or barren areas and to begin a new ecological cycle.

PLANNING AREA ANALYSIS (PAA). A BLM planning document, analyzing social economic, institutional, infrastructural, and environmental factors and establishing economic demand projections for a planning area. Data and analysis in PAAs are used for preparing management framework plans (MFPs).

PLANT VIGOR. The relative well being and health of a plant as reflected by its ability to manufacture sufficient food for growth and maintenance.

PREFERENCE LANDS. The privately owned or controlled land upon which the issuance of a grazing lease is based.

PRESCRIBED BURNING. The intentional burning of the wildland fuels of a predetermined area under proper weather, fuel moisture, and soil moisture conditions to achieve planned benefits with minimum damage at acceptable costs.

PRIMITIVE AREAS. Areas established to preserve, protect and enhance lands of scenic splendor, natural wonder, scientific interest, primitive environment, and other natural values for the enjoyment and use of present and future generations. BLM primitive areas are managed to maintain the same quality of lands included in the National Wilderness Preservation System.

PRIVILEGES, ACTIVE GRAZING. The present maximum allowable grazing use, usually expressed in AUMs.

PROPER USE FACTOR (PUF). A degree and time of use of current year's growth, which, if continued, will either maintain or improve the range condition consistent with conservation of natural resources.

PUBLIC LAND. Federal lands administered by the Bureau of Land Management.

QUALIFICATIONS. See Grazing Preference.

RANCH VALUE. The total value of a livestock operation, based on the value of privately owned land, livestock, buildings, machinery, and the right to use AUMs on Federal, Forest Service, and State lands.

RANGE CONDITION. The present state of a vegetation subtype, determined by a subjective assessment of the mix of forage and browse species. Range condition for a subtype may be rated good, fair, or poor. (See appendix I-1.)

RANGE IMPROVEMENT. A structure, development, or treatment used in concert with management to rehabilitate, protect, and improve public land and its resources; to arrest range deterioration; and to improve forage conditon, fish and wildlife habitat, watershed protection, and livestock production, all consistent with land use plans.

RANGE SITE. A distinctive kind of rangeland that differs from other kinds in its ability to produce a characteristic natural plant community.

RANGE SUITABILITY. The adaptability of a range to grazing by livestock, game, or both (Range Term Glosary Committee, 1974).

RANGE TREND. A change in vegetation and soil characteristics resulting directly from environmental factors, primarily climate and grazing.

RECREATION INFORMATION SYSTEM (RIS). The system for gathering and recording data needed to carry out BLM's recreation program.

RELICT. A remnant of plant life from a time when the plant life was more widely distributed.

REST-ROTATION GRAZING. A system in which one part of the range is ungrazed for an entire grazing year or longer, while other parts are grazed for a portion or all of a growing season.

RESEARCH NATURAL AREA (RNA). A physical or biological unit in which current natural conditions are maintained insofar as possible. Activities such as grazing and vegetation manipulation are prohibited unless they replace natural processes and contribute to the protection and preservation of an area. In RNAs, recreation, such as camping and gathering plants, is discouraged.

RESIDUAL IMPACT. The adverse impact of an action occurring after application of all mitigating measures.

RIPARIAN. Situated on or pertaining to the bank of a river, stream, or other body of water. Riparian is normally used to refer to the plants of all types that grow along streams or around springs.

RUNOFF (HYDRAULICS). That portion of the precipitation on a drainage area that is discharged from the area in stream channels. These include surface runoff, groundwater runoff, or seepage (Soil Conservation Society of America, 1970).

SACRIFICE AREA. A portion of the range, regardless of site, that is allowed to be overgrazed to obtain efficient overall use of the management area. Such areas commonly occur around waters.

SALVAGE (ARCHAEOLOGICAL). Emergency recovery of cultural or paleontological data to prevent their loss from human or natural disturbance. Recovery techniques usually include partial or complete excavation.

SCARIFICATION. Mechanical disturbance of the upper soil layer in preparing a site for seeding and planting.

SECTION 4 PERMIT. A permit issued by BLM under Section 4 of the Taylor Grazing Act, allowing privately funded range improvements on public lands.

SEDIMENT LOSS. Solid material (sediment) transported out of a watershed by wind or water.

SEDIMENT YIELD. The volume of soil moved from its point of origin to another point on the Earth's surface.

SHRUB. A relatively low-growing, muchbranched, many-stemmed woody perennial.

SOCIAL-ECONOMIC PROFILE (SEP). An information document for use in BLM planning and decisionmaking. The SEP describes the social and economic characteristics of the human population and analyzes and records the economic, social, historical and public coordination data for the social-economic profile area (SEPA).

SOCIAL-ECONOMIC PROFILE AREA (SEPA). A region or area of similar social, economic or institutional characteristics for which a social-economic profile (SEP) is prepared. A SEPA represents an area whose external or spillover effects with other areas are not significant.

SOIL SURFACE FACTOR (SSF). A numerical expression of surface erosion caused by wind and water as reflected by soil movement, surface litter, erosion, pavement, pedestalling, rills, flow patterns, and gullies. Values vary from zero for no erosion condition to 100 for a severe condition.

SPECIFIC CONDUCTANCE (ELECTRICAL). A measure of the ability of water to conduct an electrical current, expressed in micromhos per centimeter at 25 degrees C. It is related to the number and specific chemical types of ions in the water solution.

STOCKING RATE (LEVEL). Number of grazing animals on a given area of land at any time. The stocking rate may be above, below, or equal to the proper carrying capacity and may be expressed as AUMs per acre, AU years per section, or acres per AUM or AU years.

SUBCLIMAX. A state of succession in which further development is inhibited by the influence of factors other than climate.

SUBIRRIGATED LAND. Land whose water table is high enough to support lush plant life.

SUCCESSION. An orderly process of biotic community development that involves changes in species, structure, and community processes with time. It is reasonably directional and therefore predictable.

SUSTAINED YIELD. Achieving and maintaining a permanent high level, annual or regular period production of the various renewable land resources without impairing the productivity of the land and its environmental values.

TARGET SPECIES. Plant species to be reduced or eliminated by land treatment.

TEXTURE (VISUAL). The visual result of the tactile surface characteristics of an object.

THREATENED SPECIES. Any species likely to become endangered within the foreseeable future throughout all or a significant part of its range.

TOTAL DISSOLVED SOLIDS (TDS). Salt—an aggregate of carbonates, bicarbonates, chlorides, sulfates, phosphates, and nitrates of calcium, magnesium, manganese, sodium, potassium, and other cations that form salts. High TDS solutions can change the chemical nature of water. High TDS concentrations exert varying degrees of osmotic pressures and often become lethal to life in an aquatic environment.

TRAILING. Controlled directional movement of livestock. Natural trailing is the habit of livestock or wildlife repeatedly treading in the same line or path (Range Term Glossary Committee, 1974).

TRAVEL INFLUENCE ZONE. A buffer zone along each side of a travel route where visual intrusions affecting the quality of scenery along the route are prohibited.

UNGULATES. Hoofed mammals, most of which are herbivorous and many of which have horns.

UNIT RESOURCE ANALYSIS (URA). The system of data gathering and analysis that precedes land use planning for public lands.

USE (GRAZING). The consumption and destruction of forage by grazing animals or the amount of forage so consumed and destroyed. Use is usually expressed in animal unit months (AUMs).

UTILIZATION (FORAGE). The proportion of current year's forage consumed or destroyed by grazing animals. Utilization is usually expressed as a percentage.

UTILIZATION CAGE. A wire mesh box that is placed on plant species to prevent use by livestock or wildlife. At the end of the growing season, the cage is removed and comparisons are made between grazed and ungrazed areas.

VEGETATION SUBTYPE. Subdivision of a vegetation type, which generally indicates an aspect to the viewer of dominant species or a single dominant species. For example, vegetation type = conifer; vegetation subtype = pinyon-juniper.

VEGETATION TREND. See range trend.

VISITOR DAY. 12 visitor hours, which may be aggregated continuously, intermittently, or simultaneously by one or more people.

VISUAL RESOURCE MANAGEMENT (VRM) CLASSES. Classification of landscapes according to the kinds of structures and changes that are acceptable to meet established visual goals.

WARM-SEASON PLANT. A plant whose growth period or major portion thereof occurs in spring, summer, and fall and that is usually dormant in the winter. See cool-season plant.

WATER TABLE. The upper limit of the part of the soil or underlying rock material that is wholly saturated with water. In some places an upper or *perched* water table may be separated from a lower one by a dry zone.

WATERSHED CONSERVATION AND DEVELOPMENT SYSTEM. BLM's system of inventory for present and potential watershed conditions. Phase I develops soil surface factors (SSFs) and other pertinent data.

WEANER. A young animal recently weaned from its mother.

WILDERNESS. An uncultivated, uninhabited, and usually roadless area set aside for preservation of natural conditions. According to Section 2 (c) of the Wilderness Act of 1964,

> A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

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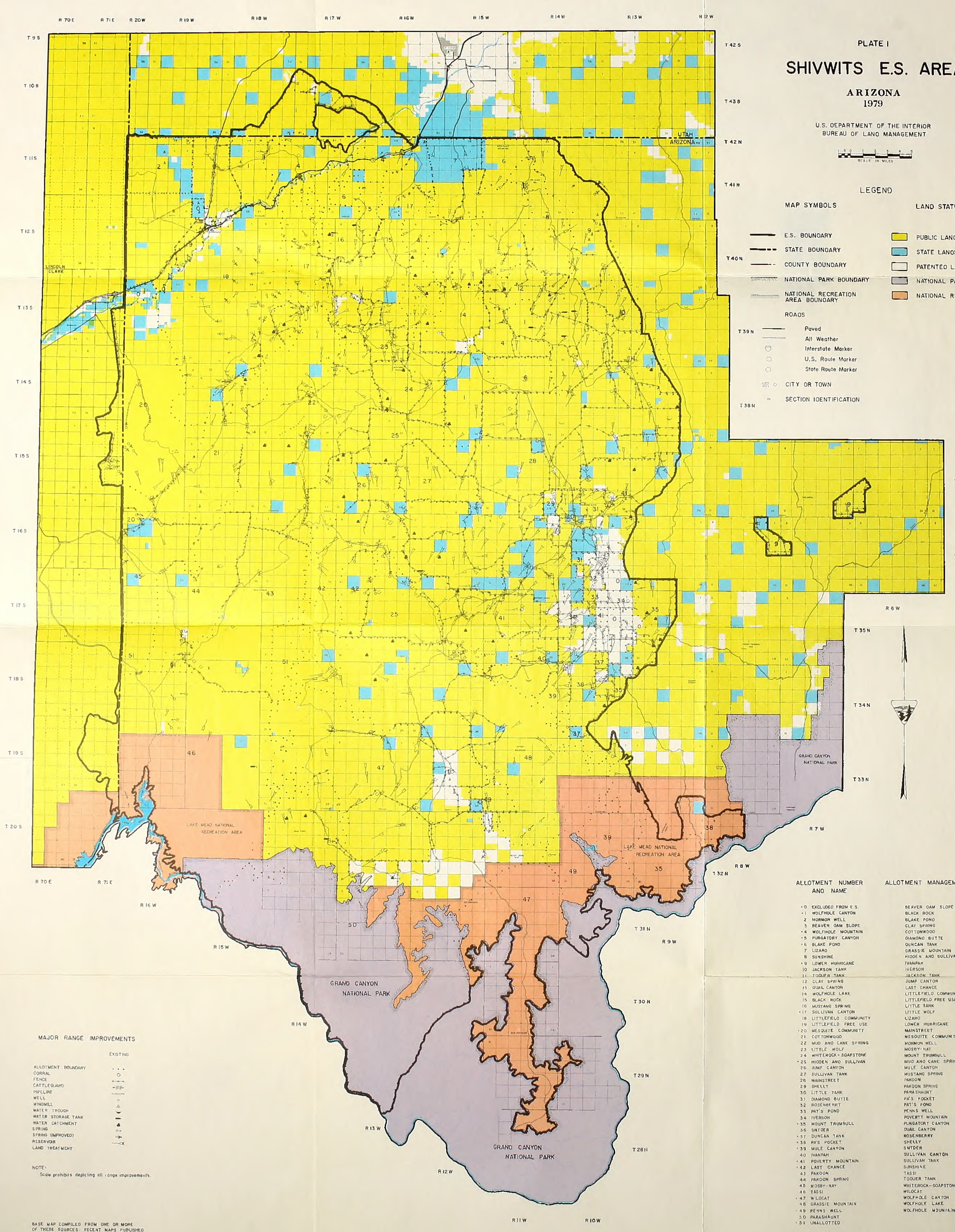
PLATE I

SHIVWITS E.S. AREA

ARIZONA
1979

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT



LEGEND

MAP SYMBOLS

- E.S. BOUNDARY
- STATE BOUNDARY
- COUNTY BOUNDARY
- NATIONAL PARK BOUNDARY
- NATIONAL RECREATION AREA BOUNDARY

ROADS

- Paved
- All Weather
- Interstate Marker
- U.S. Route Marker
- State Route Marker

- CITY OR TOWN
- SECTION IDENTIFICATION

LAND STATUS

🟨 PUBLIC LANDS
🟦 STATE LANDS
☐ PATENTED LANDS
▨ NATIONAL PARKS
🟧 NATIONAL RECREATION AREA

MAJOR RANGE IMPROVEMENTS

EXISTING

- ALLOTMENT BOUNDARY
- CORRAL
- FENCE
- CATTLEGUARD
- PIPELINE
- WELL
- WINDMILL
- WATER TROUGH
- WATER STORAGE TANK
- WATER CATCHMENT
- SPRING
- SPRING (IMPROVED)
- RESERVOIR
- LAND TREATMENT

NOTE:
Scale prohibits depicting all range improvements.

BASE MAP COMPILED FROM ONE OR MORE OF THESE SOURCES: RECENT MAPS PUBLISHED BY THE U.S.G.S., U.S.F.S., STATE HIGHWAY DEPARTMENT, B.L.M. RECORDS, LOCAL MAPPING SOURCES AND AERIAL PHOTOGRAPHY

ALLOTMENT NUMBER AND NAME

•0	EXCLUDED FROM E.S.
•1	WOLFHOLE CANYON
2	MORMON WELL
3	BEAVER DAM SLOPE
•4	WOLFHOLE MOUNTAIN
•5	PURGATORY CANYON
•6	BLAKE POND
7	LIZARD
8	SUNSHINE
•9	LOWER HURRICANE
10	JACKSON TANK
11	TOQUER TANK
12	CLAY SPRING
13	QUAIL CANYON
14	WOLFHOLE LAKE
15	BLACK ROCK
16	MUSTANG SPRING
•17	SULLIVAN CANYON
18	LITTLEFIELD COMMUNITY
19	LITTLEFIELD FREE USE
•20	MESQUITE COMMUNITY
21	COTTONWOOD
22	MUD AND CANE SPRING
23	LITTLE WOLF
24	WHITEROCK-SOAPSTONE
•25	HIDDEN AND SULLIVAN
26	JUMP CANYON
27	SULLIVAN TANK
28	MAINSTREET
29	SHELLY
30	LITTLE TANK
31	DIAMOND BUTTE
32	ROSENBERRY
33	PAT'S POND
34	IVERSON
•35	MOUNT TRUMBULL
36	SNYDER
•37	DUNCAN TANK
•38	PA'S POCKET
•39	MULE CANYON
40	IVANPAH
•41	POVERTY MOUNTAIN
•42	LAST CHANCE
43	PAKOON
44	PAKOON SPRING
45	MOSBY-NAY
46	TASSI
•47	WILDCAT
48	GRASSIE MOUNTAIN
•49	PENNS WELL
50	PARASHAUNT
•51	UNALLOTTED

• Indicates more than one area under this number

ALLOTMENT MANAGEMENT PLAN

BEAVER DAM SLOPE	3
BLACK ROCK	15
BLAKE POND	6
CLAY SPRING	12
COTTONWOOD	21
DIAMOND BUTTE	31
DUNCAN TANK	37
GRASSIE MOUNTAIN	48
HIDDEN AND SULLIVAN	25
IVANPAH	40
IVERSON	34
JACKSON TANK	10
JUMP CANYON	26
LAST CHANCE	42
LITTLEFIELD COMMUNITY	18
LITTLEFIELD FREE USE	19
LITTLE TANK	30
LITTLE WOLF	23
LIZARD	7
LOWER HURRICANE	9
MAINSTREET	28
MESQUITE COMMUNITY	20
MORMON WELL	2
MOSBY-NAY	45
MOUNT TRUMBULL	35
MUD AND CANE SPRING	22
MULE CANYON	39
MUSTANG SPRING	16
PAKOON	43
PAKOON SPRING	44
PARASHAUNT	50
PA'S POCKET	38
PAT'S POND	33
PENNS WELL	49
POVERTY MOUNTAIN	41
PURGATORY CANYON	5
QUAIL CANYON	13
ROSENBERRY	32
SHELLY	29
SNYDER	36
SULLIVAN CANYON	17
SULLIVAN TANK	27
SUNSHINE	8
TASSI	46
TOQUER TANK	11
WHITEROCK-SOAPSTONE	24
WILDCAT	47
WOLFHOLE CANYON	1
WOLFHOLE LAKE	14
WOLFHOLE MOUNTAIN	4

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